Young and Walter Johnson, Northport, Wash. (1945). **Ore:** Lead, zinc. **Ore min:** Galena, sphalerite. **Deposit:** Disseminated sulfides in limestone at and near its contact with granite. **Dev:** 5 open pits. **Ref:** 68, p. 10. **157.**

Young America (147)
(see under zinc)

WHATCOM COUNTY

Allen Basin (6)
(see under gold)

Azurite (12)
(see under gold)

Baltimore Mines, Inc. (7)
(see under gold)

Chancellor (8)
(see under gold)

Evergreen (4)
(see under gold)

Galena
(see Verona under gold)

Gargett (2)
(see under gold)

Gold Hill (9)
(see under silver)

Golden Arrow
(see Tacoma under gold)

Great Excelsior (1)
(see under gold)

Indiana
(see Chancellor under gold)

Lincoln
(see Great Excelsior under gold)

Mammoth (10)
(see under gold)

Northern Cascade
(see Gold Hill under silver)

Peterson
(see Gold Hill under silver)

President
(see Great Excelsior under gold)

Saginaw (3)
(see under gold)

Tacoma (11)
(see under gold)

Verona (5)
(see under gold)

Willow Lake
Loc: On upper Skagit R. **Prop:** 1 unpatented claim. **Owner:** Alfred Standberg, Seattle, Wash. (1952). **Ore:** Lead. **Ref:** 158.

YAKIMA COUNTY

Chinook (3)
(see under copper)

Elizabeth Gold Hill (2)
(see under gold)

Gold Hill (1)
(see under gold)

Keystone (5)
(see under copper)

Richmond (4)
Loc: NE¼ sec. 32, (16-13E), on Martha Cr. near headwaters of N. Fk. of Rattlesnake Cr. **Elev:** 4,600 ft. **Access:** 3 mi. by trail from Clover Spring. **Prop:** 26 unpatented claims. **Owner:** George V. Rankin, Frank Hardy, William Eamon, and Lin B. Bissell, Yakima, Wash. (1946). **Ore:** Lead, silver, zinc, copper, gold. **Ore min:** Galena, tetrahedrite, sphalerite, pyrite, malachite, azurite, arsenopyrite, bornite, chalcopyrite. **Gangue:** Siderite, calcite, quartz. **Deposit:** A 2-ft. shear zone in andesite. Brecciated rock has been cemented by calcite and ore minerals. Ore minerals occur in small local shoots. **Dev:** 3 adits, one 50 ft., another 10 ft. long, and a longer one caved. Also a shaft and an open cut. **Improv:** Cabin (1946). **Assays:** 5 assays on picked samples show 22.5 to 248.0 oz. Ag, 0.02% to 5.02% Pb, 0.08% to 1.08% Zn, 0.02% to 1.87% Cu. **Ref:** 58, p. 58. **158.**

LITHIUM

Properties—Lithium is the lightest element which is solid at ordinary temperatures, and only the gases hydrogen and helium have lower atomic weights. It is less than one-third as heavy as aluminum and half as heavy as water. It is silver white and has a brilliant luster on fresh surfaces but slowly tarnishes when exposed to air. It is ductile, readily extrudable, and soft (H=0.6), being harder than sodium and potassium but softer than lead and softer than talc. Chemically, it is similar to the other alkali metals, sodium, potassium, rubidium, and cesium. It has a valence of 1, and forms salts analogous to those of sodium and potassium. Lithium reacts with water to form the hydride and hydrogen. Pound for pound, it is the most effective metallic reducing agent, and it is not only an efficient deoxidizer but it also has a high affinity for nitrogen, hydrogen, sulfur, phosphorus, carbon, and silicon. Other properties are shown in the table on page 12.

Uses—Lithium metal, alloys, and compounds have a wide variety of uses, although as yet only in comparatively small quantities. The principal use of the metal is as a scavenger for degasification and deoxidation of high-conductivity copper and other nonferrous metals. Similarly, it is used as a "getter" in vacuum tubes. The metal is used in certain organic chemical reactions, and is reported to be used in the production of tritium for the thermonuclear bomb ("hydrogen bomb") project of the United States Atomic Energy Commission. Lithium may be alloyed with aluminum, lead, copper, zinc, iron, calcium, beryllium, and magnesium; even in very minor amounts it imparts the qualities of hardness, toughness, tensile strength, ductility, and improved uniformity to its alloys. In high-pressure castings it densifies the grain in the metal and eliminates porosity. It is used to improve the qualities of certain steels and is used, as a substitute for tin, to harden bearing alloys. Lithium minerals and compounds have an even wider use than the metal and alloys, in the glass, optical, ceramic, chemical, and air-conditioning industries. Lithium chloride is one of the most efficient desiccants known. In addition, various lith-

ium salts are used in high-temperature greases (an important and rapidly expanding use), in medicines (a declining use), in photographic developers, alkaline storage batteries, and pyrotechnics. Lithium hydride (LiH) is a convenient source of hydrogen. One cubic foot of the hydride, when combined with water, will produce 2,300 cubic feet of hydrogen.

Production—The only two plants in the United States producing the metal in 1950 were in New Jersey and Minnesota. Their total output usually is only a few tens of thousands of pounds per year. Annual shipments of lithium ore from domestic mines averaged 1,327 tons (equivalent to 88 short tons of Li_2O) valued at $48,280 per year in the years 1935-1939. The 1940 shipments were nearly one-third larger, and by 1944 they were 10 times larger. By 1947 production dropped back to only about one-fifth of the war-time peak, but this was still twice as great as pre-war, and production increased rapidly again, so that by 1950 the tonnage almost equaled the war-time high, and the value was greater.

No lithium minerals have been mined in Washington, nor are there any plants in the state producing the metal or its compounds.

Prices—Lithium metal was valied at $96 per pound in 1929, but at only $18 in 1931, and near $15 for the next 10 years. Metal of 98-percent purity was quoted at $12.50 per pound in 1945, at $9.85 to $11 in 1950, and $11 to $14 in 1955. Prices quoted for lithium ore in 1950 were: (1) amblygonite, air floated, carlots, $110 per ton; (2) lepidolite, 4 percent Li_2O, powdered, carlots, $80 per ton; and (3) spodumene, 6 percent Li_2O, carlots, $6 to $8 per short ton unit of contained Li_2O.

Ore minerals—Lithium has been found in more than 140 minerals, mostly silicates and phosphates, in quantities ranging from spectroscopic traces to more than 9 percent. Lithium is more abundant in the earth's crust than tin, lead, or zinc. It is widely distributed in minute quantities, but only 3 minerals have been important ores of lithium: the phosphate, amblygonite, $LiAl(F,OH)PO_4$, containing 8 to 9 percent Li_2O; and the silicates, lepidolite, $KLi(OH,F)_2Al_2Si_3O_{10}$ (lithium mica), containing 2 to 4 percent Li_2O, and spodumene, $LiAl(SiO_3)_2$, containing 2 to 4 percent Li_2O. Zinwaldite, a variety of lepidolite, containing 2 to 3 percent Li_2O, and triphylite, $LiFePO_4$, containing 2 to 6 percent Li_2O, have also been mined for their lithium content. In recent years lithium compounds have been recovered in important quantities from the brines of Searls Lake in California. These brines contain about 0.0115 percent Li_2O, and it is likely that other playa lake muds, brines, and salts may prove valuable for their lithium content. Many mineral springs contain lithium in very low concentration. Although much lithium ore is processed to make the metal and compounds, much ore also is used by industry without treatment other than concentration and purification.

Geology—Except for the playa lake brines, salts, and muds, the lithium deposits are restricted to pegmatites. Most pegmatites contain few if any lithium minerals, and where these do occur it is seldom in any considerable quantity. The lithium minerals apparently come in as a late phase in the formation of complex pegmatites, such as those that contain tin or columbium-tantalum. Pegmatites rich in lithium are likely to be poor in feldspar. Usually the lithium minerals occupy the central portion of pegmatite bodies.

Occurrences

Lepidolite has been reported to occur in a dike a few miles west of Riverside, Okanogan County, and an occurrence at the Royal Development mine in Chelan County is mentioned (under mica) in Part I of this report. It is probable, however, that the report of the latter occurrence is erroneous. Lithium has been detected spectroscopically in water from Summit Creek Soda Springs in eastern Lewis County.

MAGNESIUM

Properties—Magnesium is a silver-white metal having a bright luster; it slowly oxidizes in moist air, the thin oxide coat protecting the metal from further action. Magnesium is light in weight (37 percent less than aluminum), the only lighter metals being lithium, potassium, sodium, and calcium. It is ductile, malleable, and fairly tough. It has excellent machinability (best of the industrial metals) but has a low modulus of elasticity and is incapable of being easily cold-worked. Only silver, copper, and aluminum have higher electrical conductivity, and in mass conductivity it is second only to aluminum. Magnesium is bivalent in all its chemical compounds. It is a powerful reducing agent, and in ribbon or powder form it ignites on heating and burns with a brilliant white flame. Other properties are shown in the table on page 12.

Uses—In 1950, transportation equipment used the greatest quantity of magnesium, principally as aircraft and automotive parts. Magnesium was used in about equal amounts in castings, sheet, structural shapes (extrusions), and aluminum alloys, and in somewhat smaller quantities as cathodic protection against corrosion—a rapidly increasing use. During war times magnesium consumption is largely for aircraft parts and for incendiary bombs. The metal is used in metallurgy as a deoxidizing and desulfurizing agent in smelting nickel and making nickel alloys, and as a reducing agent in the production of titanium and zirconium. The addition of only 0.1 percent of magnesium to cast iron produces the equivalent of malleable iron, and this use accounted for more than a million pounds of magnesium in 1952. The powdered metal has long been used in pyrotechnics, signal lights, and photoflash lights. Magnesium has been used in place of zinc in dry batteries. Increasing uses are being developed in household appliances, tools, machinery, office equipment, sporting goods, and transportation equipment. Most magnesium is alloyed—aluminum, zinc, manganese, copper, zirconium, and cerium being the more common alloying metals. Magnesium is used in the chemical industries, especially in the synthesis of complex organic compounds. Magnesium compounds are used in medicine and for a wide range of industrial uses.

Production—The first commercial production of magnesium metal in the United States was 44 tons in 1915. Under the impetus of World War I, production rose to

142 tons in 1918, then later dropped back to less than 80 tons annually for a few years. It gradually rose to 6,261 tons in 1940, and 48,963 tons in 1942, then jumped to 183,584 tons as a result of military demands in 1943, only to again drop far back to 5,317 tons in the post-war year of 1946. The output in 1950 (all from 1 plant) had risen to 15,726 tons, and 2 years later it had reached 105,386 tons (from several plants). In 1943, the peak year, 63 plants, nearly all government owned, were in operation or preparing to operate. One of these, having an annual capacity of 24,000 short tons, was near Spokane, at Mead, but it operated only about a year and produced only 12,000 tons of magnesium and an equal amount of ferrosilicon before being closed and "put in mothballs" in November 1944. This plant was again in production from August 1951 to May 1953. During both its periods of operation the Mead plant used dolomite from a quarry at Marble in Stevens County.

Prices—The first metallic magnesium produced in this country in 1915 sold for $5 per pound. By 1918 the price was down to $1.81 per pound and by 1927, to 69 cents. The decline continued, reaching 30 cents in 1933 and 26 cents in 1934, but there was an increase to 30 cents in 1935. Again the price dropped, and from 1943 through 1949 it remained at 20½ cents per pound for ingots, 99.8-percent purity, in carlots. Several increases in 1950 brought the price to 24½ cents, where it remained through 1952. In June 1953 the price was 27 cents per pound.

Ore minerals—Magnesium is a very common element and constitutes 2.1 percent of the earth's crust. It is the third most abundant of the engineering metals, being surpassed in quantity only by aluminum and iron. It never occurs free in nature, but its compounds are very abundant, and a great many of the common rock-forming minerals contain magnesium. Minerals which have been mined as ores of magnesium are: magnesite, $MgCO_3$, containing 28.7 percent magnesium; dolomite $CaCO_3 \cdot MgCO_3$, containing 13.1 percent magnesium; brucite, $Mg(OH)_2$, containing 41.6 percent magnesium; and carnallite, $KMgCl_3 \cdot 6H_2O$, containing 8.7 percent magnesium. For many years underground brines containing about 3 percent magnesium chloride were the only source of the metal utilized in this country, but sea-water bitterns are now an important source. Natural sea water contains about 0.13 percent magnesium. A method to recover the metal from the silicate mineral olivine, $(Mg,Fe)_2SiO_4$, containing 28 to 30 percent magnesium, has been developed but never tried on a commercial scale.

Geology—The several ore minerals of magnesium occur in a great variety of deposits. Dolomite occurs as thick beds of sedimentary rock or its metamorphosed equivalent. It is abundant in the Paleozoic and pre-Cambrian rocks of northeastern Washington. Magnesite is found as replacements of dolomite or limestone, as veins in serpentine, and as chemical precipitates. Some of the largest deposits of the replacement type known in this country are in the pre-Cambrian Stensgar dolomite belt near Chewelah in Stevens County. The largest magnesite producer in the United States has been operating in these deposits almost continuously since 1916, but the products of this plant have been refractories rather than magnesium metal.

Olivine has several modes of occurrence. One of the largest deposits in the country is in the Twin Sisters Mountains in Whatcom and Skagit Counties, where an ultrabasic intrusive, constituting a mountain mass about 10 miles long by 5 miles wide, includes fresh, nonserpentinized olivine, free of other minerals, cropping out in an area of several square miles. The rest of the ultrabasic rock is a mixture of olivine and pyroxene, and a small area of serpentine.

Occurrences

The magnesium ore minerals which are known to occur in commercial quantities in Washington are described in Part I of this report, under dolomite and magnesite. Other magnesium minerals described in Part I are olivine, brucite (under miscellaneous nonmetallic minerals), and epsomite and brines (under saline compounds).

MANGANESE

Properties—Manganese metal is steel gray or gray white and has a slightly ruddy tinge. It is lustrous, hard, and brittle. Three allotropic forms of the metal are known. It resembles iron both physically and chemically. It is superficially oxidized when exposed to air. In its compounds manganese shows valences of 2, 3, 4, 6, and 7. Other properties are shown in the table on page 12.

Uses—In 1950 more than 96 percent of the consumption of manganese in this country was in the metals industries; 2½ percent went to dry batteries; and 1½ percent, to chemicals. It is used as a scavenging agent or as an alloying component in more alloys, probably, than any other element. Its principal combinations are with iron, copper, aluminum, magnesium, and nickel as bases. Manganese is an essential constituent of all grades of commercial steel, being used as an oxidizer and desulfurizer in the manufacturing process. Also, when added to steel in larger amounts it increases the hardness, toughness, and strength, as well as allowing the steel to be more easily rolled and forged. Consumption of manganese in the steel industry averages 14 pounds per ton of steel. Manganese chemicals are used in the manufacture of glass and ceramics, paint, dyes, fertilizer, leather, medicines, disinfectants, and such gases as oxygen, chlorine, and bromine.

Production—Normally about 90 percent of the manganese consumed in this country is imported. During the 50 years following 1900, imports have risen steadily from about 200,000 short tons of ore to 1,800,000 tons annually. Domestic production was essentially nil from 1900 to 1915, but rose to a peak of 342,573 short tons in 1919 during the first world war, only to drop back to an average of about 50,000 tons annually until the beginning of the second world war. A second peak of 247,616 tons was

reached in 1944, and the post-war production through 1952 has averaged about 125,000 tons per year.

The first recorded production of manganese ore in Washington was 101 tons in 1916. The next production was 18,228 short tons from 1924 through 1926, then 11 tons in 1939, and 33,596 tons from 1941 through 1946. A few carloads were shipped in 1952 and 1953. During the 1941 to 1946 period, Washington's production amounted to about 3½ percent of the total United States output. Production has been reported in Clallam, Grays Harbor, Jefferson, Mason, and Okanogan Counties, but by far the most of the ore has come from the Crescent mine at the west end of Lake Crescent, Clallam County.

Prices—The price schedules for manganese metal, alloys, and ore are quite complex, the price varying with such factors as grade, impurities, and place of origin. In general, prices are comparatively low during normal times. During World War I they rose to a sharp peak, but during World War II prices were stabilized by government order. In 1952, prices of imported ore of metallurgical grade were $1.20 to $1.25 per long-ton unit (22.4 pounds of contained manganese), 48 percent manganese, duty extra. Chemical-grade ore was quoted at $65 per long ton, minimum 80 percent MnO_2, Brazilian or Cuban ore, carlots, in barrels. Domestic chemical-grade ore, 70 to 72 percent MnO_2, f.o.b. mines, was $45 per long ton. Ferromanganese alloy was quoted at $200 per net ton, 74 to 76 percent manganese, f.o.b. Pennsylvania plants; and manganese metal, at 36 to 37½ cents per pound, 96 percent manganese, carlots, bulk, delivered. Buyers' specifications regarding impurities in manganese ores vary somewhat, but, in general, metallurgical-grade ore should have high manganese (45 to 50 percent) and low silicon, oxygen, phosphorus, sulfur, and nonferrous metals, but the calcium oxide content may be high. Chemical-grade ore requires high manganese dioxide content, may have a considerable amount of silicon and phosphorus, but must be low in calcium oxide.

Ore minerals—Manganese is the twelfth most abundant element in the earth's crust. It is present in small amounts as a primary element in all igneous rocks, and is an essential constituent of more than 120 minerals. Pyrolusite, MnO_2, containing 63.2 percent manganese, is the most important ore mineral, followed by psilomelane, an oxide containing 45 to 60 percent manganese and various amounts of adsorbed water and barium, potassium, and sodium oxides. Other ore minerals are braunite, $3Mn_2O_3 \cdot MnSiO_3$, containing 69.0 percent manganese; hausmannite, Mn_3O_4, containing 72.1 percent manganese; manganite, $Mn_2O_3 \cdot H_2O$, containing 62.5 percent manganese; wad, impure hydrous oxides of manganese of varying composition; and rhodochrosite, $MnCO_3$, containing 47.8 percent manganese. Recently, consideration as possible ores of manganese has been given to the silicates, rhodonite, $MnSiO_3$, containing 42.0 percent manganese, and bementite, $2MnSiO_3 \cdot H_2O$, containing about 32 percent manganese and 35 percent silica. Most, if not all, of the above minerals are found in ore deposits in Washington, and bementite, a rare mineral elsewhere in the world, comprises most of the manganese mineralization in the Olympic Peninsula. Other manganese minerals of more or less incidental interest found in the Olympics are neotocite, inesite, ephroite, manganophyllite, manganocalcite, piedmontite, and jacobsite.

Geology—Most of the world's supply of manganese comes from sedimentary and residual deposits. Other types are hydrothermal open-space fillings or replacement deposits and metamorphosed deposits. Of particular interest in Washington are the deposits in the Olympic Peninsula, where bementite is the principal ore mineral; it is commonly accompanied by jasper and usually occurs closely associated with red argillaceous limestone intercalated with submarine lavas. The ores here appear to have been derived from the rapidly cooling lavas and deposited on the ocean floor, possibly as a gel, at the time the lavas were extruded beneath the sea.

Occurrences

The map showing the numbered manganese occurrences is plate 15, on page 41 in volume 2.

CHELAN COUNTY

Black

Loc: NW. of Wenatchee. **Owner:** C. A. Black, Seattle, Wash. (1949). **Ore:** Manganese. **Ore min:** Psilomelane, pyrolusite. **Deposit:** Said to be a 2- to 10-ft. vein of ore of unknown length and depth. **Dev:** Scant. **Assays:** Grab sample: 49% to 52.6% Mn, 2.02% to 2.4% Fe, 15% SiO_2, 0.066% P. **Ref: 158.**

Peterson

Loc: Stehekin dist., along the N. side of Bridge Cr. **Ore:** Manganese. **Ref: 40**, p. 24. **67**, p. 42.

CLALLAM COUNTY

Associated (17)

Loc: Sec. 25, (30-11W). **Owner:** Thomas R. Barton, Sappho, Wash. (1941). **Ore:** Manganese. **Deposit:** Well-defined "vein." **Ref: 158.**

Aurora Ridge (48)

Loc: Sec. 7, (29-8W). **Elev:** 5,200 ft. **Access:** 8 mi. by trail from Olympic Highway at a point 1 mi. E. of Lapoel. **Owner:** Ralph V. Beymer, Seattle, Wash. (1947). **Ore:** Manganese. **Deposit:** 3 exposures of ore. **Ref: 157. 158.**

Barbara (12)

Loc: SW¼ sec. 23, (30-11W). **Elev:** 2,320 ft. **Access:** 350 ft. W. of the Kloshe Nanich trail. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** 2 bementite bodies enclosed in greenstone, one 20 ft. long and 5 ft. av. width, the other 16 ft. by 5 ft. **Assays:** 16.51% to 39.80% Mn, 11.69% to 21.75% Fe, 30.01% to 44.85% SiO_2. **Ref: 48-A**, p. 27. **94**, p. 17.

Barnes Creek (49)

Loc: Near headwaters of a S. tributary to Barnes Cr. in what would be about sec. 7, (29-8W) if area were surveyed. **Elev:** 4,200 ft. **Access:** Trail to Lizard Head Peak. **Prop:** 2 claims: Lakeview, Victory. **Ore:** Manganese. **Ore min:** Bementite, psilomelane, braunite. **Gangue:** Chalcedony. **Deposit:** 3 deposits, one exposed on face of a high bluff has an est. height of 175 ft., width of 50 ft., and length of 125 ft. **Assays:** U. S. Bureau of Mines sample from Lakeview claim: 11.4% Mn,

21.4% Fe, 34.8% insol., 31.7% SiO_2, 9.5% Ca, 0.05% S, 0.8% Al_2O_3, 0.050% P, 0.85% MgO, nil Ba, nil Zn. U. S. Bureau of Mines sample from Victory claim: 26.0% Mn, 14.0% Fe, 30.7% insol., 26.9% SiO_2, 6.9% CaO, 1.35% S, 0.4% Al_2O_3, 0.054% P, 1.0% MgO, nil Ba, nil Zn. **Ref: 48-A**, p. 32. **94**, p. 19. **109.**

Beans (44)

Loc: N. side of Storm King Mtn., 2 mi. from Maple Grove on Lk. Sutherland. **Owner:** Wm. Thompson et al. **Ore:** Manganese. **Ref: 158.**

Bear Creek

(see Victor)

Bear Ridge (4)

Loc: N½ sec. 23, (30-12W) and vicinity. **Access:** On ridge extending from Bear Cr. to Beaver Cr. **Ore:** Manganese. **Ore min:** Bementite, some neotocite and hausmannite. **Deposit:** Several manganiferous deposits. One lens is 20 ft. long and 2 to 3 ft. thick in center. **Dev:** Open cut. **Ref: 48-A**, p. 26. **94**, pp. 17-18.

Beaver Creek

(see State Lease)

Bertha (47)

Loc: Just below the crest of Aurora Ridge about 1½ mi. W. of Lizard Head Peak. **Elev:** 4,900 ft. **Access:** A poor trail from Olympic Hot Springs. **Prop:** 1 claim. **Owner:** Harry Sweeds et al., Port Angeles, Wash. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** Main outcrop extends NW. for about 50 ft. but pinches from 40 to 6 ft. in this distance. Ore lies between red argillaceous limestone and basalt. **Assays:** High iron content. **Ref: 48-A**, p. 32. **94**, p. 19. **127**, pp. 447-448.

Blue Eyes (11)

Loc: N½SW¼ sec. 24, (30-11W). **Elev:** 2,260 ft. **Access:** 1 mi. N. of U. S. Highway 101, 3 mi. E. of Snider Ranger Station. **Ore:** Manganese. **Ore min:** Bementite and some neotocite. **Deposit:** 2 bodies of ore. One is 54 ft. long and 19 ft. av. width. The other is 34 ft. long and 8 ft. av. width. Ore occurs in red argillaceous limestone. **Dev:** 2 trenches. **Ref: 48-A**, pp. 27-29. **94**, pp. 16-17.

Bright Angel (41)

Loc: Sec. 28, (30-9W). **Prop:** 12 claims. **Owner:** Edward Fitzpatrick, Ovington, Wash. (1941). **Ore:** Reportedly manganese, antimony, and tin, but the occurrence of antimony or tin here is most unlikely. **Prod:** 1941. **Ref: 99**, 2/12/35. **104**, 1/30/35, p. 23. **158.**

Broken Shovel (59)

(see also Idaho, Broken Shovel, and Ella)

Loc: Sec. 20, (29-6W). **Ore:** Manganese. **Deposit:** 40- by 500-ft. ore body. **Assays:** 25.8% Mn, 15.2% Fe, 34.1% SiO_2. **Ref: 158.**

Cedar (45)

(see also Thompson)

Loc: Sec. 34, (30-8W). **Prop:** 1 claim of Thompson group. **Ore:** Manganese. **Assays:** 19.2% Mn, 5.4% Fe, 39.9% SiO_2. **Ref: 158.**

Chappie (54)

Loc: On a spur connecting Hurricane Ridge and Unicorn Peak. Approx. sec. 24, (29-7W). **Elev:** 3,600 to 5,500 ft. **Prop:** 8 claims. **Ore:** Manganese. **Ore min:** Predominantly bementite. **Deposit:** Outcrops exposed in the face of vertical serrated cliffs 100 to 300 ft. high. Ore bodies 2 to 5 ft. thick. **Assays:** 17.4% Mn, 15.0% Fe, 22.8% SiO_2. **Ref: 48-A**, p. 34. **94**, p. 20. **158.**

Charles A. (37)

Loc: Sec. 19, (30-9W), on southward-facing slope on which Crescent mine is located but at lower elev. **Prop:** 1 claim: Charles A. **Ore:** Manganese. **Deposit:** Reportedly a good showing. **Ref: 125**, pp. 19-20.

Charles G. (38)

Loc: Sec. 19, (30-9W), on southward-facing slope on which Crescent mine is located but somewhat lower in elev. **Prop:** 1 claim: Charles G. **Ore:** Manganese. **Deposit:** Reportedly a good showing. **Ref: 125**, pp. 19-20.

Clallam (8)

Loc: NW¼NW¼ sec. 28, (30-11W). **Elev:** 1,615 to 1,675 ft. **Access:** 1 mi. NW. of Snider Ranger Station on U. S. Highway 101. No trail. **Ore:** Manganese. **Ore min:** Bementite, cinnabar, neotocite, hausmannite. **Deposit:** 5 lenses of manganese ore lying between greenstone and red argillaceous limestone—54 ft. long, 10 ft. wide; 20 ft. long, 4 ft. wide; 26 ft. long, 5 ft. wide; 12 ft. long, 3 ft. wide; and 26 ft. long, 5½ ft. wide. **Dev:** 5 trenches. **Assays:** 5.57% to 30.92% Mn, 8.90% to 29.69% Fe, 19.90% to 58.54% SiO_2. **Ref: 48-A**, p. 27. **94**, p. 17. **127**, p. 445.

Crescent (33)

(see also Peggy)

Loc: Near line between secs. 23 and 24, (30-10W), Lk. Crescent area. **Elev:** 1,000 ft. at main adit. **Access:** Road. Railroad crosses the property. **Prop:** 3 patented claims, 1 unpatented claim. **Owner:** Leased by Dan C. Peacock, Orinda, Calif. (1955). Jamison & Peacock (1923-1926). Washington Manganese Co. (1926-1927). Leased by the Sunshine Mining Co. from Charles S. Anderson, Theodore F. Rixon, and Mrs. K. Morgenroth (1941-1945). Leased by K. E. Hopper, Mel Lewis, and Sam Marsh, Seattle, Wash. (1953). **Ore:** Manganese. **Ore min:** Hausmannite, bementite, neotocite, cinnabar, native copper, braunite, hematite. **Gangue:** Manganiferous carbonate, inesite, calcite. **Deposit:** 3 known lenses of manganese ore in crushed limestone and greenstone. 2 lenses mined out. A third, 1,150 ft. below surface. The upper lens was 120 ft. long, 180 ft. deep, and 6 to 14 ft. thick, av. about 8 ft. **Dev:** 5 adits with drifts and stopes total more than 3,500 ft. of underground workings. **Improv:** 1,400-ft. aerial tram from mine to bunker on the Lyon & Hill Railway. **Assays:** Av. of 16,000 tons shipped: 50.92% to 54.33% Mn, 8.93% to 7.78% SiO_2, 1.13% to 0.74% S, 0.055% to 0.53% P_2O_5. Shipments in 1941-1946 av. about 51.6% Mn, 1.6% Fe, 9.1% SiO_2, 0.05% P, 4% H_2O. **Prod:** 16,275 short tons 1924-1926, about 33,500 short tons 1941-1946, small amount 1952, 1953. **Ref: 48-A**, pp. 30-31. **82**, pp. 52-54 (1942 ?). **94**, pp. 13-14. **108**, 5/42, pp. 9-15; 1/53, p. 87. **125**, pp. 16-19. **127**, pp. 443-445. **142**, p. 110. **158.**

Daddy and Mother (40)

Loc: Common discovery post 67 ft. E. and 7 ft. N. of SW. cor. lot 4, sec. 30, (30-9W). **Elev:** 780 ft. **Access:** 30 ft. above county road to Ovington. **Prop:** 2 unpatented claims: Daddy, Mother. **Owner:** Charles S. Anderson and Theodore F. Rixon, Port Angeles, Wash. (1934). **Ore:** Manganese. **Ore min:** Principally bementite, some hausmannite, neotocite. **Gangue:** Chalcedonic quartz. **Deposit:** Lens of ore in altered basalt 2 ft. in greatest thickness. **Dev:** Short adit. **Assays:** 30.60% Mn, 4.60% Fe, 26.50% SiO_2 from outcrop. **Ref: 48-A**, p. 32. **94**, p. 14. **125**, pp. 20-21. **158.**

Daisy (39)

Loc: Near SW. cor. sec. 19, (30-9W), E. of Peggy claim. **Elev:** 2,100 ft. **Access:** Trail. **Prop:** 7 unpatented claims. **Owner:** Joe Orris et al., Port Angeles, Wash. (1934). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Outcrops show an

av. thickness of about 6 ft. over lateral distance of 300 ft. They are not parts of a continuous body. **Dev:** 30-ft. adit. **Ref: 48-A,** p. 32. **94,** p. 14. **158.**

Divide (28)

Loc: SW¼ sec. 22, (30-10W). **Ore:** Manganese. **Ref: 158.**

East Extension

Loc: Olympic Mountains. **Ore:** Manganese. **Ref: 158.**

Ed B (Madeline, Eureka) (19)

Loc: SW¼ sec. 19, (30-10W), and SE¼ sec. 24, (30-11W). **Elev:** 1,545 to 1,825 ft. **Access:** About 1 mi. N. of U. S. Highway 101, 1 mi. W. of Heckles. Road in bad condition. **Prop:** 6 unpatented claims: Ed B, Jim, Joker, Joe, Lillian, Burnt Mountain. **Owner:** Ed. Brooks et al., Port Angeles, Wash. (1934). **Ore:** Manganese. **Ore min:** Bementite, limonite, hematite, neotocite, hausmannite, rhodochrosite, pyrolusite, psilomelane. **Gangue:** Chalcedony. **Deposit:** 3 ore bodies—260 ft. long and 25 ft. av. width; 64 ft. long, 35 ft. av. width; and 125 ft. long, 82 ft. av. width—enclosed in greenstone and red argillaceous limestone. **Dev:** Overburden stripped, open cuts, 85-ft. shaft put down by U. S. Bureau of Mines; two 50-ft. adits. **Assays:** 13.63% to 33.00% Mn, 11.40% to 34.66% Fe, 12.75% to 55.94% SiO_2. A 2-ton sample tested by U. S. Bureau of Mines showed 25.7% Mn, 11.0% Fe, 29.9% insol., 26.9% SiO_2, 2.6% CaO, 5.2% Al_2O_3, 0.026% P, 0.36% MgO, nil Ba, nil Zn. **Ref: 48-A,** p. 29. **58,** p. 39. **94,** p. 16. **109. 125,** pp. 21-22. **127,** pp. 444-446. **158.**

Ella (60)

(see also Idaho, Broken Shovel, and Ella)

Loc: Sec. 20, (29-6W). **Ore:** Manganese. **Assays:** 13.2% Mn, 8.4% Fe, 68.3% SiO_2. **Ref: 158.**

Eureka

(see Ed B)

Eureka Creek (13)

Loc: SE¼ sec. 24, (30-11W), E. of Eureka Cr. **Elev:** 1,545 ft. **Ore:** Manganese. **Ore min:** Limonite, hematite. **Deposit:** Body of ore exposed for a length of 125 ft., width of 82 ft., and depth of 10 ft. Ore lies between greenstone and red limestone. Limestone grades into limonite with small patches of hematite. **Dev:** Trenching and stripping. **Ref: 48-A,** p. 29. **94,** p. 16.

F. and L. (61)

Loc: NW¼NW¼ sec. 20, (29-6W), on a spur trending northward from Hutton Ridge. **Elev:** 4,000 to 4,200 ft. **Access:** By trail either up river from the Little R. road or from the Hurricane Lookout road to the S. **Prop:** 7 claims. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Manganiferous bodies 6 to 43 ft. wide exposed for 200 ft. Bodies pinch and swell within short distances. **Dev:** Trenches. **Assays:** 9.92% to 25.80% Mn, 9.28% to 16.58% Fe, 34.10% to 63.88% SiO_2. **Ref: 48-A,** p. 34. **94,** p. 20. **127,** pp. 449-450. **158.**

Fir

Loc: T. 30 N., R. 8 W. **Ore:** Manganese. **Ref: 158.**

Griff Creek (51)

Loc: Sec. 1, (29-7W). **Ore:** Manganese. **Ref: 158.**

Happy Lake Ridge

Loc: N. slope of Happy Lk. Ridge. **Ore:** Manganese. **Ore min:** Presumably bementite. **Deposit:** Small outcrops containing manganese minerals are exposed for distance of 1½ mi. eastward from Bertha claim. **Ref: 48-A,** p. 32.

Heckle

Loc: Clallam County. **Ore:** Manganese. **Ref: 158.**

Helen (27)

Loc: Near center N½ sec. 21, (30-10W). **Elev:** 1,905 and 1,965 ft. **Access:** ¾ mi. N. of U. S. Highway 101, 1½ mi. E. of Heckles. **Owner:** Mel Lewis and K. E. Hopper, Seattle, Wash. (1953). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** 2 bementite ore bodies, one 30 ft. long and 6 ft. wide, the other 23 ft. long and 6 ft. wide. **Dev:** 3 trenches. **Assays:** 26.38% to 40.74% Mn, 6.62% to 19.47% Fe, 9.07% to 32.40% SiO_2. **Ref: 48-A,** p. 30. **94,** p. 15.

Hemlock (42)

(see also Thompson)

Loc: Sec. 29, (30-8W). **Elev:** 3,250 ft. **Access:** 3 mi. from road. No trail. **Prop:** 1 claim of Thompson group. **Ore:** Manganese. **Deposit:** 6 ft. wide. **Dev:** 20-ft. shaft, open cut. **Assays:** 33.6% Mn, 3.6% Fe, 22% SiO_2. **Ref: 58,** p. 29. **158.**

Hurricane (52)

Loc: Near Hutton Cr., a few hundred ft. S. of the Skookum claims. **Elev:** 4,000 ft. **Access:** By trail either up river from the Little R. road or from the Hurricane Lookout road to the S. **Prop:** 1 claim: Hurricane. **Ore:** Manganese. **Ore min:** Hausmannite. **Deposit:** Ore body said to consist primarily of hausmannite of high grade. Another ore body 300 ft. eastward. **Dev:** Shaft more than 45 ft. deep, a 25-ft. adit, and 2 open cuts. **Assays:** Said to be high grade. **Prod:** 1,000 tons of ore taken out. **Ref: 48-A,** p. 33. **127,** pp. 448-449.

Hurricane Hill Lookout (55)

Loc: Sec. 23, (29-7W), along crest of ridge extending westerly from Hurricane Hill Lookout. **Access:** Trail. **Ore:** Manganese. **Deposit:** Small natural outcrops of ore. **Ref: 158.**

Idaho, Broken Shovel, and Ella (62)

(see also Broken Shovel, Ella)

Loc: Sec. 20, (29-6W), on crest of Hutton Ridge. **Elev:** 4,200 to 4,720 ft. **Access:** By trail either up river from the Little R. road or from the Hurricane Lookout road to the S. **Prop:** 3 claims: Idaho, Broken Shovel, Ella. **Ore:** Manganese. **Gangue:** Jasper. **Deposit:** Massive manganese bodies 50 to 200 ft. long and 20 to 125 ft. wide occur intermittently for a distance of 4,000 ft. **Assays:** 13.84% to 25.06% Mn, 13.02% to 12.14% Fe, 50.85% to 53.59% SiO_2. **Ref: 48-A,** pp. 33-34. **94,** p. 21. **127,** pp. 449-450. **158.**

J and J and Sunset (56)

Loc: Sec. 23, (29-7W), extending 2 mi. along S. edge of Hells Canyon at W. end of Hurricane Ridge. **Elev:** 5,500 ft. **Prop:** 3 claims. **Ore:** Manganese. **Ore min:** Bementite, neotocite. **Deposit:** Several outcrops of manganese silicates. **Assays:** 6.6% Mn, 11.2% Fe, 15.2% SiO_2. **Ref: 48-A,** p. 34. **94,** p. 21. **158.**

Johnnie M.

(see Peacock and Johnnie M.)

June (21)

Loc: SE¼SE¼ sec. 19, (30-10W). **Elev:** 1,265 ft. **Access:** About 1 mi. NW. of Heckles. **Ore:** Manganese. **Ore min:** Bementite, cinnabar. **Deposit:** Bementite lens enclosed in basalt and red limestone. Cinnabar veinlets in limestone. **Dev:** Shaft 16 ft. deep and 13 by 9 ft. in section. **Assays:** 14.98% to 18.18% Mn, 19.34% to 23.61% Fe, 26.78% to 30.99% SiO_2. **Ref: 48-A,** p. 29. **94,** pp. 15-16.

Kate (6)

Loc: Sec. 30, (30-11W). **Ore:** Manganese. **Ref: 125,** p. 21.

King

Loc: T. 30 N., R. 8 W., in Olympic Mountains. **Ore:** Manganese. **Ref: 158.**

Lady Norma (50)
Loc: Sec. 30, (30-6W). **Ore:** Manganese. **Ref: 158.**

Last Chance (22)
Loc: Sec. 20, (30-10W). **Ore:** Manganese. **Ref: 158.**

Lena (29)
Loc: Sec. 22, (30-10W). **Ore:** Manganese. **Ref: 158.**

Littleton (23)
(see also Peacock and Johnnie M.)

Loc: Sec. 20, (30-10W), 500 ft. W. of Littleton Cr. **Elev:** 1,400 ft. **Access:** Road within ¼ mi. of the property. **Prop:** 3 unpatented claims: Star, Peacock, Johnnie M. **Owner:** Charles H. Anderson leasing to K. E. Hopper, Mel Lewis, Sam Marsh, Seattle, Wash. (1952——). Charles S. Anderson and C. W. Greenlee, Port Angeles, Wash. (1934). **Ore:** Manganese. **Deposit:** Outcrop about 6 ft. thick, 50 ft. long, and 6 ft. high. **Dev:** Caved adit, surface stripping. **Assays:** A sample from the outcrop assayed 44.35% Mn, 2.25% Fe, 14.3% SiO_2, 0.026% P. **Prod:** 1952, 1953. **Ref: 48-A,** p. 30. **94,** p. 15. **108,** 1/53, p. 87. **125,** p. 21. **158.**

Lookout (34)
Loc: SE¼ sec. 23, (30-10W). **Ore:** Manganese. **Ref: 158.**

Lost Kremer (18)
Loc: Sec. 25, (30-11W). **Ore:** Manganese. **Ore min:** Cinnabar was found in NW¼ sec. 25, (30-11W), in the E. bank of small stream, possibly at the Lost Kremer property. **Assays:** 2.73% Mn, 19.68% Fe, 70.14% SiO_2. **Ref: 158.**

Lucky Strike (20)
Loc: SE¼ sec. 20, (30-10W). **Ore:** Manganese. **Ref: 158.**

Madeline
(see Ed B)

Mark Twain
Loc: Clallam County. **Ore:** Manganese. **Ref: 158.**

Maybee (9)
Loc: Sec. 28, (30-11W). **Ore:** Manganese. **Ref: 125,** p. 21.

Mother
(see Daddy and Mother)

Mount Angeles (63)
Loc: On S. side of Third Peak of Mt. Angeles, probably in sec. 20, (29-6W). **Ore:** Manganese. **Deposit:** Ore exposures of substantial size are reported. **Ref: 158.**

Oberg
Loc: T. 30 N., R. 11 W. **Ore:** Manganese. **Ref: 125,** p. 21.

Old Gold Quartz (35)
Loc: SW¼ sec. 24, (30-10W). **Ore:** Manganese. **Ref: 158.**

Olympia Star (24)
Loc: NW¼ sec. 20, (30-10W). **Ore:** Manganese. **Ref: 158.**

Peacock and Johnnie M. (25)
(see also Littleton)

Loc: On Littleton Cr. in sec. 20, (30-10W). **Elev:** 1,400 and 1,700 ft. **Access:** About 1½ mi. NE. of Heckles. **Prop:** Part of Littleton Cr. group. **Ore:** Manganese. **Ore min:** Bementite, neotocite. **Deposit:** 4 exposures—14 ft. long and 10 ft. wide, 9 ft. long and 5 ft. wide, 10 ft. long and 6 ft. wide, and another small exposure. **Assays:** 33.08% to 33.20% Mn, 7.17% to 7.42% Fe, 23.86% to 25.54% SiO_2. **Ref: 48-A,** pp. 29-30. **94,** p. 15.

Peggy (36)
(see also Crescent)

Loc: NW¼ sec. 24, (30-10W), 1,300 ft. NE. of portal of main Crescent adit. **Elev:** 2,100 ft. **Prop:** 1 claim: Peggy (part of Crescent property). **Owner:** E. F. McTarnahan, Port Angeles, Wash. (1952). **Ore:** Manganese. **Ore min:** Hausmannite, pyrolusite. **Gangue:** Calcite. **Deposit:** Body of ore similar to that at Crescent mine encountered 85 ft. below the surface, 4 ft. thick and 15 ft. long. **Dev:** Drill hole. Shaft to depth of drill hole now caved. **Assays:** 45.90% Mn, 8.21% Fe, 17.6% SiO_2. Preliminary work indicates ore equivalent to the Crescent. **Ref: 48-A,** pp. 31-32. **94,** p. 14. **125,** p. 20. **133,** p. 38. **158.**

Pine Ridge (14)
Loc: SE¼ sec. 24, (30-11W), 1 mi. N. of U. S. Highway 101, 1½ mi. W. of Heckles. **Elev:** 2,135 ft. **Ore:** Manganese. **Ore min:** Bementite, limonite, hematite. **Deposit:** Manganese ore body between greenstone and limestone, exposed for length of 62 ft. and av. width of 24½ ft. **Dev:** Trench, 45-ft. adit, short crosscut. **Assays:** 12.33% to 25.69% Mn, 11.92% to 33.15% Fe, 18.33% to 60.65% SiO_2. **Ref: 48-A,** p. 29. **94,** p. 16. **158.**

Riverside (10)
Loc: NE¼ sec. 28, (30-11W). **Ore:** Manganese. **Ref: 158.**

Royal (2)
Loc: Sec. 10, (31-14W), 3 mi. up Big R. from Royal. **Ore:** Manganese. **Ore min:** Bementite, cinnabar, free mercury. **Deposit:** Outcrop 22 ft. long with 7-ft. av. width. **Ref: 48-A,** p. 26.

St. Regis (26)
Loc: NE¼ sec. 20, (30-10W), 1 mi. N. of U. S. Highway 101, 1 mi. E. of Heckles. **Elev:** 1,985 ft. **Ore:** Manganese. **Ore min:** Bementite, cinnabar. **Deposit:** Bementite lenses with lengths of 22 and 10 ft. and widths of 12 and 6 ft. respectively. Cinnabar veinlets in the bementite. **Dev:** 2 trenches. **Assays:** 33.2% Mn, 7.17% Fe, 23.86% SiO_2. **Ref: 48-A,** p. 30. **94,** p. 15. **158.**

Seattle (7)
Loc: SE¼ sec. 21, (30-11W), on S. slope of Snider Peak about 1 mi. NW. of Snider Ranger Station. **Elev:** 1,845 ft. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Manganese ore body 25 ft. long and 12 ft. wide surrounded by altered vesicular basalt. **Dev:** Trench. **Assays:** 14.65% to 32.49% Mn, 15.63% to 23.76% Fe, 16.59% to 46.12% SiO_2. **Ref: 48-A,** p. 27. **94,** p. 17.

Section 23 (15)
Loc: SE¼ sec. 23, (30-11W), ½ mi. N. of U. S. Highway 101 and about 2½ mi. E. of Snider Ranger Station. **Elev:** 1,735 ft. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Body of bementite ore 32 ft. long and 8 ft. wide enclosed in greenstone. **Ref: 48-A,** p. 27. **94,** p. 17.

Sekiu River (1)
Loc: SE¼ sec. 27, (32-14W), about 10 mi. W. of the Hoko R. bridge. **Access:** 6 mi. by trail from Clallam Bay-Ozette Lk. road. **Ore:** Manganese, mercury. **Ore min:** Cinnabar, free mercury, manganese silicates and oxides. **Deposit:** Manganese appears to be of excellent grade. **Ref: 48-A,** p. 26. **94,** p. 18.

Skookum (53)
Loc: Sec. 12, (29-7W), 4,000 ft. NW. of the 6 mi. post on the Little R. trail, on a ridge extending northward from Unicorn Peak. **Elev:** 3,700 to 4,250 ft. **Access:** By trail either up river from the Little R. road or from the Hurricane Lookout road to the S. **Prop:** 1 claim. **Ore:** Manganese. **Ore min:** Bementite,

neotocite, some hausmannite. **Deposit:** Lenses of ore between red limestone and basalt. One is 6 to 8 ft. wide and has been explored for 200 ft. along the strike. **Dev:** 4 open cuts. **Assays:** 30.6% to 34.2% Mn, 6.2% Fe, 34.2% SiO_2. **Ref: 48-A,** p. 33. **94,** p. 20. **127,** pp. 448-449. **158.**

Sooes River

Loc: Tributaries of the Sooes R. and in hills adjacent to upper reaches of the river. **Access:** N. of the Ozette-Sekiu road. **Ore:** Manganese float. **Ref: 48-A,** p. 26.

State Lease (Beaver Creek) (3)

Loc: Near center NW¼SE¼ sec. 16, (30-12W), about 2 mi. NE. of Sappho on Beaver Cr. **Elev:** 1,300 ft. **Access:** ¼-mi. trail from Rainy Cr. road. **Prop:** State land. **Owner:** Leased by John C. Krueger, Port Angeles, Wash. (1953——). Frank Murphy Enterprises (1952). **Ore:** Manganese. **Ore min:** Hausmannite predominant, bementite, neotocite, rhodochrosite, cinnabar, mercury. **Gangue:** Chalcedonic quartz. **Deposit:** Massive lens 34 ft. long, 15 ft. wide, and 8 ft. thick in red limestone. **Dev:** 70-ft. adit, trench, sluicing. **Assays:** 41.84% Mn, 3.21% Fe, 13.68% SiO_2. As much as 6.6 lb. per ton Hg. **Prod:** 1952-1954. **Ref: 48-A,** p. 26. **94,** p. 18. **125,** pp. 22-23. **158.**

Storm King (43)

Loc: Sec. 29, (30-8W), on N. slope of Baldy Ridge between Mt. Baldy and Storm King Mtn. **Elev:** 3,400 ft. **Access:** 3 mi. from highway. No trail. **Ore:** Manganese. **Deposit:** Open cut showed ore body 6 ft. thick for a height of 7 ft. **Assays:** "Average grade." **Ref: 158.**

Summit (30)

Loc: SW¼ sec. 22, (30-10W). **Ore:** Manganese. **Ref: 158.**

Sunrise (16)

Loc: SW¼NE¼ sec. 24, (30-11W), 1 mi. N. of U. S. Highway 101, 1½ mi. W. of Heckles. **Elev:** 2,176 to 2,194 ft. **Prop:** 1 claim: Sunrise. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** 3 bodies of bementite ore—50 ft. long, 4 ft. av. width; 26 ft. long, 3 ft. av. width; and 21 ft. long, 4 ft. av. width. **Dev:** 3 trenches. **Assays:** 4.64% to 29.85% Mn, 12.76% to 34.85% Fe, 18.36% to 63.93% SiO_2. **Ref: 48-A,** p. 29. **94,** p. 16. **158.**

Sunset

(see J and J and Sunset)

Sunshine (32)

Loc: NW¼NW¼ sec. 23, (30-10W), ¾ mi. SE. of summit of Mt. Muller. **Elev:** 2,340 ft. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Body of bementite 24 ft. long and 6 ft. in av. width, enclosed in greenstone. **Ref: 48-A,** p. 30. **94,** p. 15.

Sutherland

(see Thompson)

Thompson (Sutherland) (46)

(see also Cedar, Hemlock)

Loc: Due S. of center of Lk. Sutherland in what would be about sec. 27, (30-8W) if surveyed. **Elev:** 3,400 ft. **Access:** Not accessible by trail or road; reached by 3 mi. of overland travel. **Prop:** 6 claims: Cedar, Hemlock, and 4 others. **Ore:** Manganese. **Ore min:** Bementite, neotocite, hausmannite. **Deposit:** Lenses of manganese minerals have been found for 600 ft. along strike of tuff and limestone which lie between basalt flows generally less than 3 ft. thick. **Dev:** 135-ft. shaft, sunk by U. S. Bureau of Mines, and some open cuts. **Assays:** 30.60% to 34.20% Mn, 6.20% to 9.20% Fe, 19.20% to 34.20% SiO_2. **Ref: 48-A,** p. 33. **94,** p. 19. **127,** pp. 446-447. **158.**

Three Musketeers (31)

Loc: Sec. 34, (30-10W). **Ore:** Manganese. **Deposit.** Av. 4 ft. thick. **Ref: 158.**

Victor (Bear Creek) (5)

Loc: NW¼SW¼ sec. 24, (30-12W). **Elev:** 800 ft. **Access:** 3 mi. up Bear Cr. from U. S. Highway 101, by way of Rainy Cr. road and ¼ mi. trail. **Owner:** Victor Mining Co. (1953——). H. W. Pollock and Victor Oberg, Port Angeles, Wash. (1938-1952). **Ore:** Manganese. **Ore min:** Principally bementite, also neotocite. **Deposit:** 2 ft. of siliceous ore between 2 flows of basaltic breccia. **Assays:** A 50-ton shipment av. 49.16% Mn. **Prod:** 50 tons or more in 1953. **Ref: 48-A,** p. 27. **94,** pp. 17-18. **125,** p. 21. **158.**

Victoria

Loc: Clallam County. **Ore:** Manganese. **Ref: 158.**

West Extension

Loc: Clallam County. **Ore:** Manganese. **Ref: 158.**

Whistler Flats South (57)

Loc: Sec. 24, (29-7W), on Hutton Ridge, S. of Whistler Flats. **Elev:** 4,000 to 4,200 ft. **Access:** Trail. **Ore:** Manganese. **Deposit:** Several bold outcrops 20 to 50 ft. high, as much as 125 ft. wide and 200 ft. long. **Dev:** Open cuts. **Ref: 158.**

Whistler Flats Southwest (58)

Loc: Sec. 24, (29-7W), on a spur connecting Unicorn Peak and Hurricane Ridge, SW. of Whistler Flats. **Access:** Trail. **Ore:** Manganese. **Deposit:** Ore bodies 2 to 5 ft. thick stand in vertical cliffs 120 to 300 ft. high for a distance of ¼ mi. **Ref: 158.**

Wildcat

Loc: Clallam County. **Ore:** Manganese. **Ref: 158.**

FERRY COUNTY

Humboldt (3)

(see under copper)

Last Chance (2)

(see under copper)

Meteor (1)

(see under silver)

Ray

Loc: Probably near Republic. **Owner:** Clyde W. Ray, Republic, Wash. (1941). **Ore:** Manganese. **Assays:** 49% Mn. **Ref: 158.**

GRAYS HARBOR COUNTY

Antlers (8)

(see also Egge)

Loc: SW¼ sec. 30, (22-9W), on tributary to Stevens Cr. **Access:** Trail. **Prop:** 1 claim: Antlers. **Owner:** Henry Egge, Hoquiam, Wash. (1941). **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Greenstone, jasper. **Deposit:** A lens of manganese ore in greenstone 4 ft. thick and 10 ft. in dia. **Dev:** Open cut, 10-ft. adit. **Ref: 158.**

Black Wonder (9)

Loc: N½NW¼ sec. 30, (22-9W). **Elev:** 1,300 ft. Ore: Manganese. **Ore min:** Pyrolusite, bementite, neotocite. **Deposit:** Lens of manganese ore about 4 ft. wide and perhaps 30 ft. long in greenstone. **Dev:** Several open cuts, 2 adits, each about 40 ft. long; a caved adit. **Prod:** 5 tons in 1936. **Ref: 61,** p. 51. **158.**

Burnt Mountain

(see Burnt Peak)

Burnt Peak (Burnt Mountain) (15)

Loc: SE¼ sec. 7, (21-9W). **Elev:** 800 ft. **Access:** Burnt Peak Lookout road, 2½ mi. from U. S. Highway 410. **Prop:** 1 section

(640 acres). **Owner:** Leased by Dave Pryde and Henry Egge from Polson Lumber Co. (1944). **Ore:** Manganese. **Ore min:** Bementite, manganese oxides. **Gangue:** Greenstone, jasper. **Deposit:** Several small isolated lenses of silicate ore in greenstone and red limy argillite. Aggregate tonnage may be considerable. **Dev:** 200-ft. adit, 3 open cuts, trenches. **Assays:** 36% Mn, 18% Fe, 5.5% SiO_2. **Prod:** Approx. 80 tons of ore mined and shipped. **Ref: 48-A,** p. 44. **125,** pp. 242-243.

Cook Creek (2)

Loc: NW¼SW¼ sec. 20, (22-9W). **Elev:** 1,170 ft. **Access:** Mine-to-market road up Cook Cr. from U. S. Highway 101. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** Small body of low-grade bementite ore underlying greenstone and overlying red shale. **Ref: 48-A,** p. 43. **94,** p. 25. **127,** p. 457. **158.**

Coon Creek

Loc: Coon Cr. **Owner:** Henry Egge, Hoquiam, Wash. (1941). Quinault Manganese Co. (1929-1935). **Ore:** Manganese. **Prod:** 1941. **Ref: 97,** 1935.

East Cook Creek (3)

Loc: NE¼SW¼ sec. 20, (22-9W). **Elev:** 1,250 ft. **Access:** Mine-to-market road up Cook Cr. from U. S. Highway 101. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** 2 tons of bementite-jasper ore on dump. None exposed in the adit. **Dev:** 10-ft. adit. **Ref: 48-A,** p. 43. **94,** p. 25. **127,** p. 457.

Egge (Quinault) (4)

(see also Antlers, Pioneer)

Loc: Secs. 19, 20, and 30, (22-9W), at headwaters of Cook, Skunk, and Stevens Creeks. **Access:** Roads up Stevens and Cook Creeks. **Prop:** 17 claims: Surprise, Geraldine, Ethel, Antlers, Lola, Lady Ann, Lady B., Pioneer, Sunrise, Gideon, Tubal Cain, Black Gold, Lady Margaret, Martha, Pyrolusite, Boulder, Olga. **Owner:** Henry Egge et al., Hoquiam, Wash. (1941), leasing to Consolidated Coal Exporters, Inc., Seattle, Wash. (1952——). **Ore:** Manganese. **Assays:** 2 samples gave 24.51% and 27.58% Mn, 17.58% and 24.95% Fe, 44.14% and 23.81% SiO_2. **Prod:** Minor production 1941, 1952. **Ref: 58,** p. 20. **133,** p. 32. **158.**

Esther-Irene (5)

Loc: SW¼NW¼ sec. 19, (22-9W), at head of Phillips Cr. **Elev:** 1,265 ft. **Access:** Connected to U. S. Highway 101 by mine-to-market road. **Prop:** 2 claims: Elizabeth, Esther-Irene. **Owner:** Dave Pryde and Henry Egge, Hoquiam, Wash. (1944). **Ore:** Manganese. **Ore min:** Bementite, neotocite, manganite, psilomelane. **Deposit:** Ore exposed in 4 places within 135 ft. in red argillite and greenstone. One ore body 20 ft. wide. **Dev:** Open cut and strip pits. **Assays:** As high as 40% Mn. **Prod:** At least 75 tons. **Ref: 48-A,** pp. 43-44. **127,** p. 457.

Excelsior (16)

Loc: Sec. 5, (20-12W). **Ore:** Manganese. **Ref: 158.**

Fishel (1)

Loc: S½ sec. 8, (22-9W). **Access:** 1½ mi. by trail and 36 mi. by road N. of Hoquiam. **Prop:** 1 claim. **Owner:** E. E. Fishel and George Newberry (1936). **Ore:** Manganese. **Ore min:** Bementite or hausmannite. **Gangue:** Red chalcedony. **Dev:** 18-ft. adit. **Ref: 61,** pp. 52-53.

Fossburg (22)

Loc: Sec. 20, (22-7E). **Owner:** Victor Fossburg. **Ore:** Manganese. **Ref: 158.**

A. E. Graham (23)

Loc: Secs. 18, 19, and 30, (22-7W). **Ore:** Manganese. **Ref: 158.**

Grays Harbor Title (24)

Loc: Sec. 19, (22-7W. **Ore:** Manganese. **Ref: 158.**

W. H. Hopkinson (25)

Loc: Secs. 17, 18, 19, and 30, (22-7W). **Ore:** Manganese **Ref: 158.**

Hydman (26)

Loc: Sec. 19, (22-7W). **Ore:** Manganese. **Ref: 158.**

Irene

(see Esther-Irene)

Knowles (21)

Loc: SW¼ sec. 12, (22-8W). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Float. **Ref: 158.**

Lizard (6)

Loc: Secs. 19 and 30, (22-9W), 6 mi. S. of Lk. Quinault. **Ore:** Manganese. **Ore min:** Bementite. **Assays:** Ore mined contained 36% Mn, 18% Fe, 5.5% SiO_2. **Prod:** Small amount in 1916. **Ref: 125,** pp. 242-243.

Norma

Loc: Grays Harbor County. **Ore:** Manganese. **Ref: 158.**

Paramont (17)

Loc: Sec. 6, (20-12W). **Ore:** Manganese. **Ref: 158.**

Pioneer (10)

(see also Egge)

Loc: Center N½ sec. 30, (22-9W), ¼ mi. SE. of Black Wonder workings. **Owner:** Henry Egge, Hoquiam, Wash. (1941). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** 10 ft. of manganiferous ore. **Dev:** Pit. **Ref: 158.**

Polson (30)

Loc: Sec. 30, (22-7W). **Ore:** Manganese. **Ref: 158.**

Quinault

(see Egge)

Ralfson (27)

Loc: Sec. 20, (22-7W). **Ore:** Manganese. **Ref: 158.**

Reed & Sims

Loc: Grays Harbor County. **Ore:** Manganese. **Ref: 158.**

Richards (11)

Loc: NW¼ sec. 29, (22-9W). **Ore:** Manganese. **Ref: 158.**

Robinson (28)

Loc: Sec. 18, (22-7W). **Ore:** Manganese. **Ref: 158.**

Sims

(see Reed & Sims)

Skunk-Cook Creek Divide (7)

Loc: SW¼SW¼ sec. 20, (22-9W). **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** Bementite ore in greenstone near red limestone contact. **Dev:** Small adit (caved). **Ref: 48-A,** p. 43. **94,** p. 24. **127,** p. 457.

Spurr

Loc: Grays Harbor County. **Ore:** Manganese. **Ref: 158.**

Star (12)

Loc: Near center sec. 30, (22-9W). **Elev:** 1,300 to 1,470 ft. **Access:** Trail from U. S. Highway 101 at a point about 10 mi. N. of Humptulips. **Prop:** 3 claims: Star Nos. 3, 4, and 5. **Ore:** Manganese. **Ore min:** Bementite, rhodochrosite, pyrolusite, neotocite, manganese oxides. **Gangue:** Chalcedonic quartz. **Deposit:** 3 isolated masses or lenses of bementite ore in greenstone and red limestone. One is 6 ft. wide and 10 ft. long, two others are 7 by 9 ft., and 5 by 9 ft. **Ref: 48-A,** p. 43. **94,** p. 24. **125,** pp. 23-24. **127,** p. 457.

Stevens Creek (13)

Loc: SE¼SW¼ sec. 30, (22-9W). **Elev:** 790 ft. **Access:** 3 mi. E. of U. S. Highway 101 by tractor road. **Owner:** Consolidated Minerals Co., Seattle, Wash. (1952——). Henry Egge and Robert Steele, Hoquiam, Wash. (1941). **Ore:** Manganese. **Ore min:** Bementite, some neotocite, possibly rhodonite. **Deposit:** 2 deposits in greenstone and red calcareous argillite, one 6 ft. wide can be traced 10 ft., the other 3 to 4 ft. wide exposed for 15 ft. **Dev:** Open cuts, stripping. **Improv:** Cabin (1941). **Prod:** 5 tons 1941. 1952. **Ref: 48-A,** p. 43. **94,** p. 24. **104,** 6/15/41. **108,** 6/41, p. 36. **127,** p. 457.

Stevens Creek, North Fork (14)

Loc: Sec. 30, (22-9W). **Elev:** 1,150 ft. **Access:** 1,500 ft. up N. Fk. of Stevens Cr. from the Stevens Creek occurrence. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Several large boulders of bementite. **Dev:** 12-ft. adit in greenstone. **Ref: 48-A,** p. 43. **94,** p. 24. **127,** p. 457.

Superior (18)

Loc: Sec. 6, (20-12W). **Ore:** Manganese. **Ref: 158.**

Supreme (19)

Loc: Sec. 6, (20-12W). **Ore:** Manganese. **Ref: 158.**

Thomas Svendsen (29)

Loc: Sec. 18, (22-7W). **Ore:** Manganese. **Ref: 158.**

Wynoochee (20)

Loc: SW¼SE¼ sec. 22, (23-7W), 800 ft. up Road No. 915 of Simpson Logging Co., on headwaters of Wynoochee R. **Access:** Logging road. **Owner:** Simpson Logging Co. (1951). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Outcrop 20 by 200 ft. of ore-bearing basalt. **Ref: 158.**

JEFFERSON COUNTY

Albino Rodriquez (6)

Loc: Near center NW¼ sec. 25, (26-3W), on tributary to Dosewallips R. **Ore:** Manganese. **Ore min:** Manganese silicate. **Deposit:** Manganese deposit in greenstone is 1 to 2 ft. wide and traceable for 100 ft. **Ref: 158.**

Black Hump (9)

Loc: NW¼SW¼ sec. 19, (25-3W). **Elev:** 4,500 ft. **Access:** 3 mi. up Cabin Cr. from the Hamma Hamma R. road. **Prop:** 1 claim. **Ore:** Manganese, iron. **Ore min:** Hematite. **Deposit:** Hematite in greenstone, very little manganese. **Ref: 48-A,** p. 39.

Duckabush River (8)

Loc: Secs. 4 and 5, (25-3W), on flanks of Big and Little Hump Mountains. **Access:** Duckabush R. road. **Ore:** Manganese. **Deposit:** Reported manganiferous outcrops. **Ref: 48-A,** p. 38.

Elkhorn (4)

(see also Karnes)

Loc: Secs. 13 and 24, (26-4W), on steep S. slope of Mt. Constance, between Miners Cr. and Bull Elk Cr. **Elev:** 1,000 to 5,700 ft. **Access:** 13½ mi. up Dosewallips R. road from U. S. Highway 101. **Prop:** 28 unpatented claims, including Karnes group. **Owner:** American Manganese Corp., Seattle, Wash. (1935-1951). **Ore:** Manganese. **Ore min:** Bementite predominant. **Deposit:** 3 limestone beds in basalt contain lenses of manganese ore, some with known thickness of 25 ft. **Dev:** 20 small cuts, 3 short adits, trenches. **Assays:** 23.4% to 26.4% Mn, 4.3% to 18.0% Fe, 23.4% to 39.1% SiO_2, 6.9% to 12.3% CaO. **Ref: 48-A,** p. 35. **94,** p. 22. **127,** pp. 451-452. **158.**

Karnes (5)

(see also Elkhorn)

Loc: Near center sec. 24, (26-4W). **Elev:** 2,150 ft. **Prop:** Part of Elkhorn group. **Owner:** American Manganese Corp., Seattle, Wash. (1951). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Small pods of bementite ore in limestone interbedded with greenstone. **Dev:** Several open cuts. **Ref: 158.**

Lucky Creek (7)

Loc: Sec. 25, (26-3W), on S. side of Dosewallips R. **Elev:** 1,500 to 1,790 ft. **Access:** ¾ mi. S. of Corrigenda Guard Station on the Dosewallips R. road. **Prop:** 10 claims. **Ore:** Manganese. **Ore min:** Bementite, neotocite. **Gangue:** Jasper. **Deposit:** Tabular body of silicate manganese ore 2 to 3 ft. wide exposed continuously for 500 ft. **Dev:** Short adit. **Assays:** 25.2% Mn, 6.1% Fe, 30.6% SiO_2. **Ref: 48-A,** p. 35. **94,** p. 22. **127,** p. 452. **158.**

Mount Claywood (1)

Loc: Sec. 30, (27-5W). **Elev:** 6,150 ft. **Access:** 12 mi. by trail from end of Dosewallips R. road. **Ore:** Manganese, iron. **Ore min:** Probably manganmagnetite. **Deposit:** Layers and lenses of ore conformable to associated limestone, and irregular isolated lenses in greenstone, and veins cutting greenstone. **Assays:** 14.1% SiO_2, 27.7% Fe, 16.2% CaO, 7.72% Mn. **Ref: 48-A,** pp. 35-39.

North Pole Quartz (10)

Loc: Near Lena Lk. in NE¼ sec. 35, (25-4W). **Elev:** 3,200 ft. **Access:** Trail up Lena Cr. from Hamma Hamma R. road. **Prop:** 1 claim. **Ore:** Manganese, iron. **Ore min:** Manganmagnetite (?). **Gangue:** Jasper, hematite. **Deposit:** Iron-manganese ore in greenstone, one outcrop 6 ft. by 4 ft., another 8 ft. by 5 ft. **Ref: 48-A,** p. 38.

Tubal Cain (2)

Loc: Sec. 7, (27-3W), on NW. side of Iron Mtn. **Elev:** 4,400 to 6,300 ft. **Access:** 12 mi. by trail from dirt road at Dungeness Forks. **Prop:** 11 patented claims. **Owner:** Olympic Manganese Co., Seattle, Wash. (1935-1941). Tubal Cain Copper & Manganese Mining Co. (1908-1924). **Ore:** Manganese, copper. **Ore min:** Bementite, neotocite, native copper. **Deposit:** Tabular body of manganese silicates about 300 ft. long, and 1 to 2 ft. in av. width. Wall rock mainly basalt, some limestone. **Dev:** 2,300-ft. crosscut. **Assays:** 2 assays show 5.67% and 47.39% Mn, 15.30% and 20.30% SiO_2, 9.62% and 2.51% Fe, 28.65% and 1.73% CaO. **Ref: 33,** 1908, p. 1341. **48-A,** pp. 34-35. **94,** p. 21. **98,** 1925, p. 1835. **105,** vol. 99, 1909, p. 345. **112,** p. 206. **124,** pp. 241-242. **125,** pp. 450-451. **129,** p. 318. **130,** pp. 75, 76-77. **141,** p. 84. **158.**

Tull City (3)

Loc: Approx. ½ mi. NW. of Tubal Cain adit. **Prop:** May be part of Tubal Cain group of claims. **Ore:** Manganese. **Deposit:** Manganese ore crops out on E. side of the craggy ridge between Tull City and Tubal Cain prospects. **Ref: 48-A,** p. 34. **125,** p. 450.

KITTITAS COUNTY

Denney (1)

Loc: Reportedly 5 mi. N. of Denney's cabin or approx. in the NW. part of T. 19 N., R. 15 E. **Owner:** V. C. Denney, Ellensburg, Wash. (1942). **Ore:** Manganese. **Ore min:** Manganese oxide. **Deposit:** A 1-lb. sample of pure manganese oxide reportedly came from the location above. **Ref: 158.**

LEWIS COUNTY

Chehalis River (1)

Loc: NE¼SW¼ sec. 14, (11-5W), on headwaters of E. Fk. of Chehalis R. **Access:** Trail from end of Shepard road. **Owner:** Weyerhaeuser Timber Co., Tacoma, Wash. (1952——). **Ore:** Manganese. **Ore min:** Manganese oxide. **Deposit:** Said to be a deposit of manganese which could be cheaply mined. **Assays:** 34% Mn, 12% SiO_2, 0.12% P. **Ref: 158.**

MASON COUNTY

Apex (Black Rock) (9)

Loc: Sec. 8, (23-5W), ½ mi. up Copper Cr. from Triple Trip mine. **Elev:** 2,400 ft. **Access:** ¾ mi. up Copper Cr. from Skokomish R. road near Lincoln Guard Station. **Prop:** 3 claims: Black Rock Nos. 1, 2, and 3. **Owner:** Manganese Products, Inc., Seattle, Wash. (1940). Mt. Elinor Manganese Mining & Smelting Co. (1921-1926). **Ore:** Manganese. **Ore min:** Bementite, neotocite, manganese oxides, rhodochrosite, specularite. **Gangue:** Jasper. **Deposit:** Lens of manganese ore along a greenstone-red limestone contact. Lens of 25-ft. max. width explored for length of 250 ft. **Dev:** Diamond drilling by U. S. Bureau of Mines, surface trenching. **Assays:** Sample across 6-ft. section of the lode showed 43.10% MnO, 12.65% Fe_2O_3, 3.87% CaO, 18.91% SiO_2. **Ref: 48-A,** pp. 39-40. **94,** pp. 22-23. **98,** 1922-1926. **124,** pp. 237-238. **127,** pp. 455-456. **129,** p. 315. **130,** pp. 77-78. **158.**

Arkansas Traveler (1)

Loc: Sec. 20, (24-5W), 750 ft. NW. of Black and White mine shaft. **Ore:** Manganese. **Ore min:** Bementite (?), copper sulfides and carbonates. **Deposit:** Small showing of manganese. **Ref: 48-A,** p. 41. **124,** p. 240. **127,** p. 454.

Black Hump (4)

Loc: N½N½ sec. 33, (24-5W). **Access:** 2 mi. by trail N. of Staircase resort at head of Lk. Cushman. **Prop:** 1 unpatented claim. **Owner:** L. L. Dickenson of Staircase resort (1942). **Ore:** Manganese. **Ore min:** Bementite. **Assays:** 28% Mn, 17% Fe, 25% SiO_2. **Prod:** Some production prior to 1924. **Ref: 124,** p. 240. **141,** p. 83. **158.**

Black Queen (5)

Loc: SE¼ sec. 4, (23-5W), ½ mi. below Staircase resort and ¼ mi. up W. side of Skokomish R. from Copper Cr. **Prop:** 6 claims: Black Queen Nos. 1 to 6. **Owner:** Manganese Mining & Manufacturing Co., Seattle, Wash. (1942). **Ore:** Manganese. **Ore min:** Bementite, neotocite. **Gangue:** Jasper. **Deposit:** Manganese silicate body at contact of greenstone and red calcareous argillite. **Dev:** Several open cuts, shallow shaft. **Ref: 48-A,** p. 40. **158.**

Black Rock

(see Apex)

Black and White (2)

(see under copper)

Bosnia (Steel Creek) (11)

(see also Jolly Jack)

Loc: Sec. 10, (23-6W), a short distance above Steel Cr. cabin. **Access:** About 11 mi. by trail up S. Fk. Skokomish R. from end of road at Intermount Guard Station. **Prop:** 1 claim. May be part of Jolly Jack property. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** 2 lenses of bementite rock enclosed in red limestone; one is 8 to 10 ft. wide, at least 200 ft. long, and 100 ft. in vertical extent. **Assays:** Av. of several analyses shows 24% Mn, 10.5% Fe, 30% SiO_2. **Ref: 48-A,** pp. 41-42. **94,** p. 23. **124,** p. 241. **127,** pp. 456-457. **141,** pp. 83-84.

Brown Mule

(see Triple Trip)

Hi Hope (6)

Loc: E½NE¼ sec. 4, (23-5W), across the river from Black Queen group. **Access:** Skokomish R. road near Lincoln Guard Station. **Prop:** 2 claims: Hi Hope Nos. 1 and 2 on Olympic National Park ground. **Owner:** U. S. Government. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** Manganese ore on a greenstone-red limestone contact. Ore very spotty. **Dev:** 50-ft. adit (partly caved in 1942), open cut. **Ref: 48-A,** p. 40. **158.**

India (Steel Creek) (12)

Loc: Sec. 10, (23-6W), ½ mi. beyond Bosnia claim, Lk. Cushman area. **Elev:** 2,000 to 3,500 ft. **Prop:** 1 claim. **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper. **Deposit:** Lens of bementite rock 15 ft. wide and 50 ft. long associated with red limestone. **Assays:** 13.56% to 37.64% Mn, 5.84% to 11.31% Fe, 17.16% to 52.59% SiO_2, 0.048% to 0.119% P. **Ref: 48-A,** p. 42. **124,** p. 241. **127,** pp. 456-457.

Jolly Jack (13)

(see also Bosnia)

Loc: SE¼ sec. 9, (23-6W), on tributaries of Steel Cr. **Elev:** 2,400 to 2,700 ft. **Access:** 12 mi. by road and 11 mi. by trail from Hoodsport. **Prop:** 12 unpatented claims. May include Bosnia claim. **Owner:** John Fadness, Jim Dammel, and associates, Tacoma, Wash. (1951). **Ore:** Manganese. **Ore min:** Bementite. **Gangue:** Jasper, limestone. **Deposit:** 4 exposures of ore as much as 4 ft. wide and 20 ft. long. **Dev:** Open cuts. **Ref: 158.**

Keller Smith

(see Smith)

Lucky Jack

Loc: Mason County. **Ore:** Manganese. **Assays:** 44.98% MnO, 4.00% MnO_2, 12.93% Fe_2O_3, 15.15% SiO_2, 0.19% P_2O_5, 1.45% Al_2O_3, 1.00% CaO, 17.01% ignition loss. **Ref: 58,** p. 41. **158.**

McKean (10)

(see also Triple Trip)

Loc: Sec. 5, (23-5W). **Prop:** Part of Triple Trip property. **Ore:** Manganese. **Deposit:** 6 ft. of ore but not all commercial. Similar to Triple Trip in character. **Prod:** 1918. **Ref: 129,** p. 317.

Old Crow (15)

Loc: NE¼ sec. 16, (23-6W), on a tributary of Steel Cr. **Elev:** 2,300 ft. **Access:** 12 mi. by road and 11 mi. by trail from Hoodsport. **Owner:** Alex Hunt, Hoodsport, Wash. (1951). **Ore:** Manganese. **Ref: 158.**

Rose Aster (7)

Loc: Center N½ sec. 4, (23-5W), on S. side of N. Fk. of Skokomish R., 400 ft. down river from Staircase resort. **Prop:** 1 claim. **Owner:** C. E. Brown and C. E. Russell, Olympia, Wash. (1942). **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** About 10 lb. of manganese ore exposed at contact of red argillaceous limestone and greenstone. **Dev:** Open cut. **Improv:** Cabin (1942). **Ref: 158.**

Russian No. 1

Loc: T. 23 N., R. 6 W., Lk. Cushman area. **Ore:** Manganese. **Ore min:** Bementite. **Assays:** 25.20% Mn, 28.90% SiO_2, 11.00% Fe, 0.099% P. **Ref: 158.**

Smith (Keller Smith) (3)

Loc: Sec. 22, (24-5W), 1 mi. SE. of Black and White property. **Ore:** Manganese. **Ore min:** Bementite. **Ref: 48-A,** p. 41. **124,** p. 240.

Steel Creek
(see Bosnia, India)

Triple Trip (Brown Mule) (8)
(see also McKean)

Loc: Secs. 4 and 9, (23-5W), on Copper Cr., about ½ mi. above its confluence with Skokomish R. **Elev:** 1,000 ft. **Access:** ½ mi. up Copper Cr. from Skokomish R. road near Lincoln Guard Station. **Prop:** Includes McKean claim. **Owner:** C. E. Brown and C. E. Russell, Olympia, Wash., hold the property by possessory title (1942). Triple Trip Mining & Milling Co. (1910). Mt. Elinor Manganese Mining & Smelting Co. (1921-1924). **Ore:** Manganese, iron. **Ore min:** Bementite, manganmagnetite (?). **Deposit:** Elongated lens along a basalt-red limestone contact is 50 ft. long and 1 to 4 ft. wide. **Dev:** 60-ft. crosscut with a 75-ft. drift, and another old adit with about 50 ft. of workings. **Assays:** Analyses of 6 samples showed 6% to 25% Mn, 8% to 21% Fe, 11% to 37% SiO_2, 4% to 36% CaO. **Prod:** Reportedly a carload of ore during World War I; said to contain 35% to 45% Mn, 17% to 30% SiO_2. **Ref: 48-A**, p. 39. **94**, p. 22. **98**, 1922, p. 1656; 1925, p. 1824; 1926, p. 1588. **105**, vol. 101, 1910, p. 124. **124**, pp. 236-237. **127**, pp. 454-455. **129**, pp. 315-317. **130**, pp. 75, 77. **141**, pp. 81-82. **158.**

Widow (14)
Loc: SE¼ sec. 9, (23-6W), on a tributary of Steel Cr. **Access:** 12 mi. by road and 11 mi. by trail from Hoodsport. **Prop:** 6 claims. **Owner:** Ben Booth (1951). **Ore:** Manganese. **Ref: 158.**

OKANOGAN COUNTY

Hermance
(see Moore)

Hilo
(see St. Paul under silver)

Moore (Hermance) (1)
Loc: Sec. 22, (38-30E) and secs. 30 and 31, (38-31E), 4 mi. N. of Wauconda. **Elev:** 4,200 ft. **Access:** 21 mi. by road to railroad at Republic. **Prop:** 360 acres deeded land and mineral lease on adjoining State land. **Owner:** J. A. Hermance, Wauconda, Wash. (1951). W. R. Moore, Wauconda, Wash. (1941-1943), leased (1942) by Conrad Wolfle, Spokane, Wash. **Ore:** Manganese. **Ore min:** Rhodonite, pyrolusite, pyrite. **Gangue:** Quartz. **Deposit:** Fracture zone in quartzite at its contact with shale contains small lenses of pyrolusite and stringers of quartz with small spots of rhodonite. **Dev:** Deposit has been explored for 800 ft. along strike by 3 open cuts, an 18-ft. shaft, and a 10-ft. adit. **Assays:** Most assays show less than 10% Mn. **Prod:** 3½ tons in 1936 reported by owner. **Ref: 111. 157.**

Myrtle
(see St. Paul under silver)

Pogue Flat (Three Buttes) (2)
Loc: Near SW. cor. sec. 15, (34-26E). **Elev:** 1,400 ft. **Access:** Short road from Pogue Flat road. 3.5 mi. to railroad at Omak. **Owner:** R. J. Jones, Omak, Wash. (1942). **Ore:** Manganese. **Ore min:** Pyrolusite. **Deposit:** 2 quartz veins in decomposed granite, one 2 ft. wide, the other 1 ft. wide. Manganese occurs as stringers in the quartz and as disseminations in the granite. **Dev:** 80-ft. adit, 50-ft. stope, shaft, open cut. Geophysical prospecting by P. H. Holdsworth indicates the deposit has little depth. **Assays:** 20% Mn reported in ore shipped. **Prod:** 1916, produced twenty-five 30-ton cars of ore said to contain 20% Mn. **Ref: 43**, vol. 105, 1918, p. 1082. **124**, p. 243. **130**, pp. 78-79. **141**, pp. 85-86. **158.**

St. Paul (4)
(see under silver)

Silver Cliff (3)
(see under silver)

Three Buttes
(see Pogue Flat)

PEND OREILLE COUNTY

Sterling (1)
(see under zinc)

SKAGIT COUNTY

Belleville (Koehler) (4)
Loc: NE¼SE¼ sec. 13, (35-3E), in Belleville gravel pit. **Access:** Spur of Great Northern railroad. **Prop:** Deeded land. **Owner:** Great Northern Railway Co. (1940). **Ore:** Manganese. **Ore min:** Pyrolusite. **Gangue:** Sand and gravel. **Deposit:** Crossbedded sands and gravels 30 ft. thick are underlain by a bed of gravel with a matrix of black sooty material. Sooty bed reportedly av. 4 ft. thick. **Dev:** Pit. **Ref: 111. 158.**

Eagle
(see under iron)

Fidalgo (1)
Loc: On Fidalgo Is., a few mi. S. of Anacortes. **Ore:** Manganese, copper. **Ore min:** Bementite, native copper. **Gangue:** Greenstone. **Deposit:** Bementite and hard black manganese oxide are enclosed by greenstone in which are specks of native copper. Some bementite bodies as much as 10 ft. wide. **Ref: 141**, p. 85.

Hamilton (5)
(see under iron)

Iron Mountain
(see Hamilton under iron)

Katie
(see under iron)

Koehler
(see Belleville)

Last Chance (6)
(see under iron)

Mountain Home (2)
Loc: On Fidalgo Is., a few mi. S. of Anacortes, near Lk. Campbell. **Prop:** 1 claim: Mountain Home. **Owner:** A. V. Ginnett et al. (1921). **Ore:** Manganese, copper. **Ore min:** Bementite, native copper, pyrite, chalcopyrite. **Deposit:** Bementite ore body in greenstone is 10 ft. wide. Part of the body composed of hard black oxide material similar to that in some deposits in Skokomish R. area. Lode can be traced 400 to 500 ft. **Dev:** Pit 15 ft. deep. **Ref: 124**, p. 242.

Pittsburg
(see under iron)

Samish Bay (3)
Loc: Reported on the mainland E. of Samish Bay, near the place where Chuckanut Drive crosses Oyster Cr. **Ore:** Manganese. **Ore min:** Bementite. **Deposit:** Manganiferous deposit similar to Olympic Peninsula ore. **Ref: 124**, p. 242. **141**, p. 85.

Tennessee No. 3
(see under iron)

SNOHOMISH COUNTY

Cicero (Paddock) (1)
Loc: Sec. 4, (32-6E), on S. slope of Bald Mtn. **Access:** About 1½ mi. by trail up Grant Cr. **Prop:** 1 unpatented claim. **Owner:**

William S. Paddock, Arlington, Wash. (1940). **Ore:** Manganese. **Ore min:** Pyrolusite. **Gangue:** Chert. **Deposit:** Thin sooty seams of manganese oxide along the bedding planes of chert. Less than 2 tons of manganese oxide in entire outcrop. **Dev:** None. **Assays:** One sample gave 36.35% Mn. **Ref: 158.**

French Creek (3)

Loc: Near center sec. 16, (32-8E), in cuts along French Cr. road, 4 mi. from railroad. **Access:** Road. **Ore:** Manganese. **Ore min:** Rhodonite, rhodochrosite (?), manganese oxide. **Deposit:** Road cut exposes a lens or faulted vein of rhodonite and possibly rhodochrosite in schistose greenstone. The lens or vein is 8 to 10 ft. long and 3 ft. wide. It is weathered to black manganese oxide for about 1 ft. below the surface. **Dev:** None. **Ref: 111,** p. 2. **158.**

Lake Riley (2)

Loc: W½ sec. 19, (32-7E), E. of Lk. Riley. **Ore:** Manganese. **Ore min:** Rhodonite, rhodochrosite. **Deposit:** Metamorphosed sediments. **Ref: 14,** p. 9.

Paddock

(see Cicero)

SPOKANE COUNTY

Dartford (1)

Loc: Across road from abandoned flour mill on the river at Dartford, 10 mi. N. of Spokane. **Owner:** James M. Moore, Spokane, Wash. (1943). **Ore:** Manganese. **Ore min:** Manganese oxide. **Deposit:** Vein 10 ft. wide crops out along a hillside for several hundred ft. **Assays:** 18% Mn. **Ref: 158.**

STEVENS COUNTY

Hawthorn

Loc: Probably near Colville. **Owner:** Albert W. Hawthorn, Colville, Wash. (1942). **Ore:** Manganese. **Assays:** 21% Mn. **Ref: 158.**

Johnny's Luck

(see Marty)

Marty (Johnny's Luck) (1)

Loc: N½ NE¼ sec. 6, (34-38E). **Access:** 11 mi. from railroad. **Owner:** John Marty, Rice, Wash. (1941-1952). **Ore:** Manganese. **Ore min:** Manganese oxide. **Gangue:** Quartz. **Deposit:** Secondary concentration of oxides in quartz which cements brecciated quartzite in a zone 200 ft. wide. Zone can be traced ½ mi., but only locally does it contain small areas showing manganese. **Dev:** Open cut, 12-ft. shaft. **Assays:** Est. av. less than 5% Mn. Most of the silicified zone shows only traces of Mn. **Ref: 111,** p. 2.

Turtle Lake (3)

Loc: NW¼SW¼ sec. 16, (28-38E), 1 mi. S. of Turtle Lk., in Spokane Indian Reservation. **Elev:** 2,500 ft. **Access:** Dirt road to deposit. **Ore:** Manganese. **Ore min:** Manganese oxides. **Gangue:** Quartz, feldspar. **Deposit:** Manganese and iron oxides cement decomposed granite over an exposed area of several thousand sq. ft. **Ref: 158.**

Wellpinit (2)

Loc: S. center sec. 24 and N. center sec. 25, (29-38E), in Spokane Indian Reservation, 7 mi. N. of Wellpinit. **Elev:** 2,500 ft. **Access:** Dirt road to property. **Ore:** Manganese. **Ore min:** Manganese oxides. **Gangue:** Quartz, feldspar. **Deposit:** Manganese and iron oxides cement disintegrated granite to a depth of as much as 10 ft. in an area several hundred ft. wide and about 1,500 ft. long. **Dev:** Open cuts. **Assays:** A 1,500-lb. sample ran 6.4% Mn. **Ref: 36-A. 158.**

WHATCOM COUNTY

Smith (1)

Loc: Sec. 23, (40-4E), 5 mi. E. of Everson. **Access:** On South Pass road. **Owner:** Mr. Smith. **Ore:** Manganese. **Ref: 158.**

YAKIMA COUNTY

Ironstone Mountain (1)

Loc: SE¼ sec. 19, (14-13E), near top of Ironstone Mtn. **Owner:** M. H. Van Nuys, Seattle, Wash. (1951). **Ore:** Manganese. **Dev:** Open cut. **Ref: 158.**

MERCURY

Properties—Mercury, called quicksilver by most miners, is a silver-white heavy metal (heavier than lead) which is liquid at ordinary temperatures. It solidifies at -39° C. and is then tin-white, ductile, malleable, and soft enough to be cut with a knife. Mercury when pure does not tarnish on exposure to air. It has low vapor pressure and has a regular coefficient of expansion. It is a fair conductor of heat and electricity, the thermal heat conductivity being about two-thirds that of silver. Its vapor conducts electricity and, in doing so, emits radiations rich in ultraviolet rays. Mercury alloys with most metals except iron and platinum, and it combines with sulfur at ordinary temperatures. It is next to silver in the electromotive series and resembles copper in its chemical behavior. It is both bivalent and univalent, and its compounds are poisonous, but in small doses they are medicinal. Other properties are shown in the table on page 12.

Uses—The various uses from year to year consume markedly different proportions of the total United States mercury consumption. In 1950 the most important uses were for electrical apparatus, pharmaceuticals, industrial and control instruments, and agriculture (disinfectants and fungicides), which used respectively 24, 12, 11, and 9 percent of the total consumption. Other uses, in declining order of importance, were in antifouling paint for ship bottoms, catalysts, dental preparations, electrical preparation of chlorine and caustic soda, fulminate for munitions and blasting caps, amalgamation of gold and silver ores, vermillion paint, and minor uses in making mirrors and for mercury salts for wood and fabric preservation, printing, staining, and photography. An increasing use is in a new type of dry battery, and another interesting use is in mercury-vapor boiler power plants, replacing water vapor.

Production—During periods of high mercury prices domestic mines have been able to supply the demands for the metal, but normally this country is a large importer of mercury. United States production was high during the two world wars and from 1928 to 1931, but since 1943 (highest production since 1882) domestic production dropped off each year until 1950, when the output was lower than in any year since before 1850. With increasing prices in 1951 and 1952, production increased somewhat.

Cinnabar, the ore of mercury, is known to occur in 13 of Washington's 39 counties, but the only production of any consequence has come from the Morton district of Lewis County. The first recorded production there was 75 flasks in 1916. The district later produced 6,438 flasks (76 pounds per flask) valued at $689,656 during the period 1926 through 1942, with production in each year except 1939.

Prices—For many years the price of mercury has been controlled by international cartels, but the Spanish-Italian cartel which had dominated the market was reported to be dissolved in 1950 and to be inoperative throughout the year. Average yearly mercury prices stayed very close to $40 per flask from 1876 to 1913, then rose to $120 during World War I, dropped to $45 in 1921, and gradually rose to a high of $124 in 1928, only to slip back to $58 in 1932. During World War II the average yearly price rose to $198 in 1942. After 1943 the price dropped off to a low of $70 in June 1950, then rose to $225 in January 1951, a more than three-fold increase in a period of seven months. The price continued to rise to $330 in October 1954, but by June 1955 it had dropped back to $281. Such violent price fluctuations as these are among the reasons the large mining companies are reluctant to engage in mercury mining. In 1954 the General Services Administration announced a 3½-year purchase program, with a floor of $225 per flask, to purchase 125,000 flasks of mercury from domestic producers.

Ore minerals—More than 95 percent of the world's supply of mercury comes from the sulfide, cinnabar, HgS, which contains 86.2 percent mercury. Some ores contain native mercury, others contain metacinnabarite, HgS, and a few other minerals have occasionally been mined for their mercury content. In all, about 25 mercury minerals are known.

Geology—Mercury ores are widespread in their occurrence and are found in rocks of all ages and kinds, but most commonly are in regions of late Tertiary or Recent volcanic activity. They are shallow, less than 2,000 feet deep, and usually much less than that, and were deposited from low-temperature alkaline waters in highly fractured veins and bodies of irregular shape. Common accessory minerals are marcasite, pyrite, and stibnite; and the gangue minerals may be quartz, chalcedony, opal, calcite, dolomite, or barite. The tenor of ore mined in this country in 1950 ranged from 0.15 to 5.1 percent (3 to 102 pounds of mercury per ton of ore), and averaged 0.465 percent, or 9.3 pounds per ton. For comparison, ore mined in 1850 averaged 740 pounds per ton; in 1863, 360 pounds; in 1895, 20 pounds; and in 1928, 7.9 pounds.

Occurrences

The map showing the numbered mercury occurrences is plate 16, on page 43 in volume 2.

CHELAN COUNTY

Bartlett (2)

Loc: S½ sec. 29, (23-17E), on N. side of Ingalls Cr. **Access:** 4½ mi. by trail up Ingalls Cr. from highway U. S. 97. **Prop:** 4 claims. **Owner:** Harry Bartlett, Wenatchee, Wash. (1942). **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Quartz, carbonates. **Deposit:** "Nickel ledge." **Dev:** 2 short adits. **Improv:** Cabin (1942). **Ref: 67,** p. 14.

Black Jack (6)
(see under gold)

Blewett
(see Black Jack under gold)

Cinnabar King
(see under gold)

King Creek (7)

Loc: At head of King Cr., probably in sec. 10, (22-17E). **Ore:** Mercury. **Deposit:** Veinlet of cinnabar 0.1 in. thick cuts serpentine. Can be traced 20 ft. **Ref: 161,** p. 78.

La Rica
(see Black Jack under gold)

Leavenworth
(see Orondo)

North Pole (4)
(see under gold)

Orondo (Leavenworth) (1)

Loc: In Chelan County near Orondo. **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Quartz and siliceous altered rock. **Deposit:** About 12 ft. wide, with 1 ft. of high grade. **Dev:** Small amount in 1911. **Ref: 67,** p. 26. **97,** 1911, p. 916. **141,** p. 87.

Shoshone (5)

Loc: Sec. 4, (22-17E), on N. side of Nigger Cr. at end of road. **Elev:** 3,500 ft. **Access:** 4-mi. road up Nigger Cr. from its mouth. **Owner:** G. J. Niemeyer, Z. T. Parker, and Roy Fontaine, Spokane, Wash. (1942). **Ore:** Mercury, nickel. **Ore min:** Cinnabar, garnierite (?). **Gangue:** Quartz. **Deposit:** "Nickel ledge." **Dev:** 135 ft. of adit, a small open cut. **Ref: 67,** p. 18.

Squaw Saddle (8)

Loc: On Squaw Saddle Mtn., 3 mi. from Wenatchee. **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 67,** p. 46. **130,** p. 86. **141,** p. 87.

Tom Burke

Loc: Blewett dist. **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 106,** 9/3/31, p. 13.

Velma (3)

Loc: N½ sec. 32, (23-17E), on S. side of Ingalls Cr. **Access:** 4½ mi. of trail up Ingalls Cr. from highway U. S. 97. **Prop:** 5 claims. **Owner:** L. G. Olds, Wenatchee, Wash. (1951). **Ore:** Mercury, nickel, gold, silver, copper. **Ore min:** Cinnabar, garnierite (?). **Gangue:** Quartz, carbonates. **Deposit:** "Nickel ledge." Cinnabar paystreak is 1½ to 3 ft. wide. **Dev:** Several open cuts. **Improv:** A good cabin (1949). **Assays:** As high as 0.5% Hg, and a selected sample ran 20% Ni. **Ref: 67,** p. 19. **133,** p. 40.

CLALLAM COUNTY

Beaver Creek
(see State Lease under manganese)

Clallam (4)
(see under manganese)

Crescent (8)
(see under manganese)

June (6)
(see under manganese)

Lost Kremer (5)
(see under manganese)

Royal (2)
(see under manganese)

St. Regis (7)
(see under manganese)

Sekiu River (1)
(see under manganese)

State Lease (3)
(see under manganese)

CLARK COUNTY

Golden Wonder (1)
Loc: NE¼NE¼ sec. 32, (6-4E), 2 mi. E. of Yale bridge on Lewis R. **Elev:** 300 ft. **Access:** Aerial tram across Lewis R. from Frazier ranch. **Prop:** 120 acres of deeded land. **Owner:** V. V. Rand, Vancouver, Wash. (1942). Golden Wonder Mining Co. (1934). **Ore:** Mercury, gold. **Ore min:** Pyrite, cinnabar. **Gangue:** Calcite, gouge, quartz. **Deposit:** Weakly mineralized shear zone in altered tuff. Zone is 150 to 200 ft. wide at one place. Cinnabar occurs as a few scattered crystals. **Dev:** Adit caved at 600 ft. from portal, and other short adits and open cuts also caved. **Assays:** Said to assay 0.02 oz. Au. **Ref: 158.**

Smith (2)
Loc: Sec. 16, (2-4E). **Access:** Road. **Owner:** C. L. Smith, Vancouver, Wash., leasing from State of Wash. (1951). **Ore:** Mercury. **Deposit:** Lessee reports quartz and altered rock in a very large area. **Assays:** Lessee reports 2 to 38 lb. Hg per ton. **Ref: 157. 158.**

COWLITZ COUNTY

Green River (1)
Loc: On Green R. near its confluence with the N. Fk. of Toutle R. **Owner:** J. E. Bracey, R. F. Dotsch, Olympia, Wash. (1940). **Ore:** Mercury. **Improv:** 2 amalgamators, a mercury feeder, and screens (1941). **Prod:** 1941. **Ref: 104,** 1/15/40.

Red Star
Loc: Cowlitz County. **Owner:** Red Star Mining Co. (1924). **Ore:** Mercury. **Deposit:** Mercury reportedly occurs in a 6-ft. ledge. **Ref: 141,** p. 88.

KING COUNTY

Byrd (1)
Loc: Sec. 9, (21-7E), near Byrd. **Ore:** Mercury. **Ref: 158.**

KITTITAS COUNTY

Ben Nevis
Loc: Near Mt. Hawkins. **Owner:** Ben Nevis Quicksilver Mining Co. (1921). **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 130.**

Big Thing (5)
Loc: Sec. 8, (22-16E). **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Low-grade ore. **Ref: 130,** p. 86.

Boulder Creek
Loc: Near head of Boulder Cr. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Cinnabar reportedly occurs along a joint plane in altered rock of the Peshastin formation. The ore is rich but occurs in such thin bands that it is of doubtful commercial value. **Ref: 141,** pp. 87-88. **146,** p. 14.

Denney (1)
(see under chromium)

Ellensburg
Loc: Cle Elum dist. **Owner:** Cascade Mining Corp., 100 N. La Salle St., Chicago, Ill. (1941). **Ore:** Mercury. **Ref: 13,** p. 46. **158.**

Elsener (3)
Loc: Sec. 6, (22-15E). **Access:** 17 mi. from railroad at Ronald. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Small seams in Peshastin formation. **Ref: 111,** p. 2.

H-O-M-E (6)
(see also Silver Tip)
Loc: Secs. 26, 27, 28, and 34, (19-15E), near junction of Frosty and Taneum Creeks. **Elev:** 2,000 to 3,500 ft. **Access:** 25 mi. by road from railroad at Ellensburg. **Prop:** 27 claims, 5 of which are patented. Includes Silver Tip and Gold Crown claims. **Owner:** H-O-M-E Mining Co., Seattle, Wash. (1943). **Ore:** Mercury. **Ore min:** Cinnabar, free mercury. **Deposit:** Cinnabar is found in local faults and fracture zones near contact between carbonaceous schist and highly altered calcareous sediments. **Dev:** At least 1,000 ft. of adits and shafts. Principal adit is on Silver Tip claim. **Prod:** Owner reports 9½ tons of ore shipped. **Ref: 157.**

Keystone (2)
Loc: Sec. 33, (23-15E), Cle Elum dist. **Ore:** Mercury, gold, nickel. **Ref: 58,** p. 36. **63,** p. 65.

Silver Tip (7)
(see also H-O-M-E)
Loc: Near center SE¼ sec. 28, (19-15E), on N. side of S. Fk. of Taneum Cr. **Elev:** 250 ft. above stream. **Owner:** V. C. Denney, Ellensburg, Wash., and T. F. Gannon, Ballard, Wash. (1942). **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Sheared rock. **Deposit:** Shear zone about 12 ft. wide at contact of Taneum sandstone and Easton schist contains small specks and thin seams of cinnabar. **Dev:** 300-ft. adit with two 150-ft. drifts. **Assays:** Ore said to av. 0.5% Hg, but this appears to be too high. **Prod:** 5 tons reported by owners. **Ref: 111,** p. 2. **158.**

Teanaway River (4)
Loc: At head of Middle Fk. of Teanaway R. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Cinnabar occurs as a thin seam along a joint plane in altered rock of the Peshastin formation. **Ref: 144,** p. 9.

Washington Quicksilver
Loc: Kittitas County. **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 130,** p. 86.

LEWIS COUNTY

Apex (Gallagher, Miller, Consolidated) (8)
Loc: SW¼NE¼, NW¼SE¼, and NE¼SW¼ sec. 6, (12-5E), about 800 ft. NE. of Parmenter adit, Morton dist. **Elev:** 1,875 to 2,002 ft. **Access:** About 1,000 ft. by trail from truck road to Parmenter adit. **Prop:** 120 acres. **Owner:** Apex Mercury Mining Co., Tacoma, Wash. (1943). **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Sandstone, breccia. **Deposit:** Cinnabar occurs as disseminations in sandstone and in breccia along a fault zone in coal and shale. **Dev:** 260-ft. adit, two 50-ft. adits, 1,000-ft. adit. **Ref: 92-A,** pp. 34-37. **99,** no. 4, 1935. **158.**

Barnum-McDonnell (9)
Loc: N½NW¼ sec. 7, (12-5E), about 2¼ mi. SE. of Morton. **Access:** Morton-Kosmos highway crosses lowermost adit. Other workings accessible by truck road. **Prop:** 320 acres. **Owner:**

C. W. Lane and Floyd Ray, Morton, Wash. (1954——). Barnum McDonnell Mining Co. (1916-1929). Consolidated Mercury Mining Co. (1929-1933). Puget Sound Mercury Mining Co. (1935). Hermes Mercury Mining Co. (1936-1937). Cascade Mining Co. (1938). Mercury Corp. of America (American Mercury Co.), (Pacific Mining Co.) (1940-1942). **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Cinnabar occurs in fractures and breccia along fault zones in a series of sandstones, shales, and siltstones cut by igneous sills and dikes. Shear zone has probable max. thickness of 10 ft. Best ore is in tuffaceous sandstone. **Dev:** More than 3,400 ft. of underground workings on 5 levels. **Assays:** 3 to 47 lb. Hg per ton. **Prod:** 75 flasks 1916, 489 flasks 1926, 1,265 flasks 1926-1929, 441 flasks 1931. Also produced 1932, 1934, 1941. **Ref: 92-A,** pp. 5-30. **97,** 1926-1934. **104,** 11/15/30, p. 11; 6/30/32, p. 28. **106,** 3/5/31, p. 19. **130,** p. 86. **141,** p. 88. **158.**

Chapman

Loc: Morton dist. **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 158.**

Charlotte Ann

(see Lytle-Lynch)

Consolidated

(see Apex)

Eight-Seventeen (14)

Loc: SW¼ sec. 8 and NW¼ sec. 17, (12-5E), Morton dist. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Small amounts of cinnabar. **Dev:** Prospect pits. **Ref: 158.**

Fisher

(see Roy)

Fisher Lease (4)

Loc: NE¼ sec. 36, (13-4E), Morton dist. **Access:** Reached by ½ mi. of trail from the highway. **Prop:** State lease. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Cinnabar mineralization along a fault zone in sedimentary and igneous rocks. **Dev:** 2 adits. **Ref: 158.**

Gallagher

(see Apex)

Gillispie

(see Roy)

Kropolis

(see Lytle-Lynch)

Ladd (1)

Loc: Sec. 12, (14-4E), N. of Morton. **Access:** Road. **Ore:** Mercury. **Deposit:** Cinnabar float was found when a new road was built to the upper adit of the Ladd coal mine. **Ref: 158.**

Lynch

(see Lytle-Lynch)

Lytle-Lynch (Charlotte Ann, Kropolis) (10)

Loc: NW¼ and N½NE¼ sec. 6, (12-5E), about ¾ mi. N. of the Roy-Barnum-McDonnell workings. **Elev:** 1,610 to 1,725 ft. **Access:** Truck road from Morton-Kosmos highway. **Prop:** 240 acres. **Owner:** Barnum-Patterson Mining Co. (1939). Charlotte Ann Mercury Co. (1931-1932). Baker-Fonsec Co., Portland, Oreg. (1937). **Ore:** Mercury. **Ore min:** Cinnabar, pyrite or marcasite. **Deposit:** Cinnabar occurs as thin seams in fault breccia and rocks adjacent to the fault. Country rock consists of shale, sandstone, coal, and porphyry. **Dev:** 3 adits and at least 2 caved workings. One adit 230 ft., another 110 ft., and the other 70 ft. long. **Assays:** Ore said to av. about $5.00. **Prod:** 1930-1932. **Ref: 92-A,** pp. 37-39. **97,** 1931, p. 205; 1932-1933, p. 235. **158.**

McDonnell

(see Barnum-McDonnell)

Miller

(see Apex)

Morton

(see Roy)

N. P. (3)

Loc: SW¼ sec. 31, (13-5E), Morton dist. **Prop:** 200 acres. **Owner:** Northern Pacific Railway Co. **Ore:** Mercury reported. **Dev:** Small amount. **Ref: 158.**

Parmenter (11)

Loc: Near E. line SE¼SW¼ sec. 6, (12-5E), about 2,000 ft. E. of the portal of Roy adit. **Elev:** 1,048 ft. **Access:** About 1 mi. of truck road from the Morton-Kosmos highway. **Prop:** 160 acres. **Owner:** B. H. Parmenter, Morton, Wash., leasing to John Early, Morton (1937). **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Altered country rock. **Deposit:** Sheared zone in shales, coal, porphyry, and sandstone contains a few small stringers of cinnabar. **Dev:** 425-ft. adit. **Assays:** Low grade. **Ref: 92-A,** p. 32. **158.**

Roy (Fisher, Morton, Gillispie) (12)

Loc: S½SW¼ and NW¼SW¼ sec. 6, (12-5E), 2 mi. SE. of Morton. **Elev:** 1,080 to 1,500 ft. **Access:** ½ mi. of truck road from the Morton-Kosmos highway. 2 mi. to railroad at Morton. **Prop:** 120 acres. **Owner:** Roy Mining Co. (1933-1949). Fisher Mercury Mining Co. (1926). Morton Cinnabar Co. (1926-1930). Washington Cinnabar Co. (1930-1933). Fowler & O'Conner (1938). **Ore:** Mercury. **Ore min:** Cinnabar, pyrite. **Gangue:** Calcite, hydrothermally altered country rock. **Deposit:** Cinnabar occurs along fractures and breccia zones in a series of sandstones, shales, and siltstones cut by igneous dikes and sills. Shear zone has probable max. thickness of 10 ft. **Dev:** More than 6,000 ft. of underground workings on 5 levels. **Assays:** 1931 production av. 5 lb. Hg per ton. **Prod:** About 2,500 flasks 1928-1929, 1,079 flasks 1930, 1,581 tons of ore 1931, recovered 65 flasks of mercury from 1,000 tons of ore 1940, produced 1941. **Ref: 1-A,** 1931, pp. 447-448. **92-A,** pp. 5-30. **97,** 1916, 1928-1935, 1941. **104,** 11/15/30, pp. 11, 32; 1/30/35, p. 23; 8/30/35, p. 24. **158.**

Roy No. 5 (13)

Loc: NE¼SW¼SW¼ sec. 6, (12-5E), about 1,100 ft. N. of the portal of Roy No. 1 adit. **Elev:** 1,381 ft. **Access:** Truck road from the Morton-Kosmos highway. **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Brecciated country rock, sandstone. **Deposit:** Cinnabar occurs as disseminations in coarse white massive sandstone and in a breccia at the junction of two faults. Rocks in the breccia are porphyry, coaly shale, and sandstone. **Dev:** 125-ft. adit driven along a fault. **Assays:** Lean showings of cinnabar. **Ref: 92-A,** pp. 32-34.

Section One (6)

Loc: SE¼ sec. 1, (12-4E), Morton dist. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Small amount of cinnabar. **Dev:** Prospect pits. **Ref: 158.**

Section Thirty-Six (5)

Loc: SE¼SE¼ sec. 36, (13-4E), about 2,000 ft. NE. of the Spencer workings. **Ore:** Mercury. **Ore min:** Cinnabar. **Deposit:** Cinnabar encountered in one of the old adits and in two trenches. **Dev:** 2 old adits and several trenches. Trenches opened in 1937. **Ref: 92-A,** p. 41. **158.**

Seventeen

(see Eight-Seventeen)

Spencer (7)
Loc: NW¼NE¼ sec. 1, (12-4E). **Elev:** 1,365 to 1,500 ft. **Access:** ½ mi. by road N. of Morton Grange No. 1066. **Owner:** Northern Pacific Railway Co. (1937——) leasing to Rainier Mining Co. (1954——). Spencer Mining Co. (1935). **Ore:** Mercury. **Ore min:** Cinnabar, pyrite. **Gangue:** Sandstone. **Deposit:** Cinnabar seams as much as ⅜ in. wide occur along joints in coarse sandstone. Thin cinnabar seams also occur along a 6- to 14-in. breccia zone. **Dev:** 2 caved adits, 6 shallow pits, 7-ft. shaft, caved shaft, bulldozer trenches. **Improv:** Retort. **Prod:** 1934. **Ref: 92-A**, pp. 39-41. **97**, 1935, p. 457. **158.**

Tilton River, East Fork
Loc: On E. Fk. of Tilton R. **Ore:** Mercury. **Deposit:** Cinnabar has been panned from the stream. **Ref: 158.**

Tilton River, West Fork (2)
Loc: Sec. 13, (13-4E), on W. Fk. of Tilton R. **Ore;** Mercury. **Deposit:** Cinnabar float has been found. **Ref: 158.**

OKANOGAN COUNTY

Jones (1)
(see under copper)

PIERCE COUNTY

Mashel River (1)
Loc: SE¼SW¼ sec. 18, (16-6E). **Elev:** 2,175 to 2,500 ft. **Access:** 1 mi. from end of logging road. 16 mi. from railroad at Eatonville. **Prop:** Deeded land. **Owner:** St. Paul & Tacoma Lumber Co. has given an option to lease to Joe Bath, Puyallup, Wash. (1951). **Ore:** Mercury. **Ore min:** Cinnabar. **Gangue:** Quartz. **Deposit:** Andesite is cut by several tabular masses of quartz about 100 ft. by 100 ft. by 20 ft. thick which have numerous cavities and joints filled and coated with cinnabar and limonite. **Dev:** Several short adits. **Ref: 158.**

SKAGIT COUNTY

La Conner (1)
(see under nickel)

Mount Eldorado (2)
Loc: Near a receding glacier on Mt. Eldorado, upper Cascade R. **Owner:** A. G. Mosier, Sedro Woolley, Wash. (1943). **Ore:** Mercury. **Deposit:** Cinnabar-healed breccia. **Ref: 158.**

SNOHOMISH COUNTY

Clara Thompson
(see Jasperson under gold)

Commonwealth
(see Jasperson under gold)

Dahl
(see Eclipse under gold)

Eclipse (4)
(see under gold)

Forest Hope (1)
(see under copper)

Granite Falls (5)
(see under nickel)

Jasperson (7)
(see under gold)

Justin (2)
(see under gold)

McCombs
(see Jasperson under gold)

Myrtle C. (3)
(see under copper)

Webster
(see Jasperson under gold)

Wild Rose (6)
(see under copper)

STEVENS COUNTY

Dumbolton (1)
(see under gold)

YAKIMA COUNTY

Clear Lake (3)
Loc: Sec. 12, (13-12E), near Clear Lk. **Ore:** Mercury. **Ore min:** Cinnabar. **Ref: 111.**

Indian Creek (1)
Loc: NE¼ sec. 23, (14-12E), on a tributary to Indian Cr. **Elev:** 4,525 to 4,825 ft. **Access:** 4 mi. by trail and 34 mi. by road to railroad at Naches. **Prop:** 2 unpatented claims: Denny-Ray, Indian Creek. **Owner:** Indian Creek Mercury Mines, Inc., Ray R. Whiting and Milton T. Roumm, Seattle, Wash.. (1951——). **Ore:** Mercury. **Ore min:** Cinnabar, pyrite. **Gangue:** Ankerite, dolomite, calcite, quartz. **Deposit:** Silica-carbonate hydrothermally altered zone, 150 ft. by 1,500 ft. exposed to depth of 300 ft. in gneissoid diorite, contains cinnabar widely disseminated through the zone. Slight nickel stain in places. **Dev:** 15-ft. adit, a longer adit, numerous trenches, diamond drill holes. **Assays:** Dump sample ran 0.03% Hg. Selected samples showed 4.8 to 11 lb. Hg per ton. **Ref: 133**, p. 35. **157. 158.**

Wildcat Creek (2)
Loc: NW¼ sec. 27 and NE¼ sec. 28, (14-13E). **Access:** 5 mi. by trail up Wildcat Cr. from road. **Prop:** 6 claims: Red Cloud, Iron Mountain Nos. 1 and 2, Elk Nos. 1 to 3. **Owner:** W. C. Thorp, Yakima, Wash. (1941). **Ore:** Mercury, nickel (?) **Ore min:** Cinnabar, pyrite. **Gangue:** Quartz, calcite. **Deposit:** Sandstone, conglomerate, and silica-carbonate rock laced with veinlets of calcite and quartz, some of which carry a little cinnabar. **Dev:** Open cuts, 80-ft. trench, 5-ft. pit, 25-ft. trench, 115-ft. adit, stripping. **Improv:** Cabin (1941). **Assays:** 1,600 lb. of ore reported to have produced 50 to 60 lb. of Hg. **Ref. 158.**

MOLYBDENUM

Properties—Molybdenum is usually prepared as a gray metallic powder, but the pure metal is silvery white and is soft, tough, malleable, and has high tensile strength. Very small amounts of certain impurities make the metal brittle, hard, and darker in color. It can be filed, polished, machined, forged when hot, and drawn into wire, although it was formerly thought to be non-ductile. The properties of strength, toughness, and resistance to repeated shocks are retained at relatively high temperatures. Its melting point is higher than that of all but four other elements: tantalum, rhenium, tungsten, and carbon. Its electrical conductivity is fair but is less than one-third that of copper. Molybdenum is closely related chemically to chromium, tungsten, and uranium. It has

valences of 2, 3, 4, 5, and 6, but the compounds in which it acts in the 6 state are the most important. Other properties are shown in the table on page 12.

Uses—In 1950 more than 90 percent of the molybdenum consumption was for metallurgical uses, about 70 percent going into steel and 20 percent into cast iron. The remaining 10 percent was used as the pure metal and in nonferrous alloys and nonmetallic products. Molybdenum may be used as a substitute for tungsten in many steels. Used alone in steel it gives a product which is strong and easily welded, and used with other steel-forming elements it enhances the effects of those elements on the steel. Molybdenum steels are put to such uses as boiler plate, rifle barrels, auto parts, propeller shafts, and tool steel. Added to cast iron, molybdenum adds strength, toughness, and machinability. Nonferrous alloys of molybdenum are not very important, but an alloy with cobalt is useful in having a coefficient of expansion equal to that of glass, and alloys with tungsten make good incandescent filaments. A few other alloys are chromium-molybdenum; nickel-chromium-molybdenum; and the alloy illium, that contains 4 percent molybdenum plus chromium, nickel, copper, manganese, tungsten, and iron. Pure molybdenum metal is used as supports for filaments in electric lights and radio tubes, for X-ray tube elements, for winding resistance units for electric furnaces, and for electrical contact points. Molybdenum compounds are finding increasing uses in lubricants, pigments, printer's ink, leather tanning, enameling of iron and steel, fabric dyeing, and as a catalyst in the hydrogenation of coal and mineral oil.

Production—Molybdenum is the only alloying element used in steel-making in which the United States is self-sufficient, and production in this country in the past 20 years has averaged about 90 percent of world output during that period. Domestic reserves have been estimated to be sufficient to last for 400 years at the 1935 to 1939 rate of use. A few very large mines dominate the production. Of the nine mines producing molybdenite concentrate in this country in 1950 only two were mining molybdenum as the principal product; molybdenum was a byproduct at the other seven mines, six of which were copper mines and one tungsten. United States molybdenum ore production rose from 1,397 pounds of contained molybdenum in 1914 to 861,537 pounds in 1918, dropped to 22,667 pounds in 1923, and rose to an all-time high of 61,406,000 pounds in 1943. Production had dropped to 18,047,000 pounds in 1947 but had risen again to 38,855,000 pounds by 1951.

Washington has numerous occurrences of molybdenum in at least 16 counties, but only a few of the occurrences have been in production, and these only in very small amount. Some production from the Castleman mine in Whatcom County was reported in 1899. During 1901 and 1902 about 20 to 24 tons of molybdenite was produced at the Crown Point mine in Chelan County; this mine for a few years was the only molybdenum producer in the United States. The same mine produced unrecorded amounts in 1903, 1906, 1907, 1914, and 1917. Some of the finest molybdenite specimens to be found in museums all over the country came from this property. One large crystal or cluster of crystals which was recovered weighed 300 pounds. About 22 tons of molybdenite concentrate was produced at the Deer Trail Monitor mine in Stevens County from 1936 to 1939, and in 1941 the Juno-Echo mine in the same county milled 300 or 400 tons of ore, but the molybdenum concentrate produced did not meet purchaser's specifications.

Prices—In 1900 the price was reported to be about $400 per ton of 50- to 55-percent ore. (Only about 10 tons of molybdenum metal had been produced in the world prior to 1900.) From 1908 to 1912 the price was only 30 cents per pound of contained MoS_2 in 92-percent ore. In 1914 the price varied between 70 cents and $2.00, and in 1915 to 1919, from over $3.00 to about 30 cents. The 1920 average of 74 cents per pound rose to 84 cents in 1923 and dropped to 36 cents in 1933. In 1936 it was 42 cents, from 1938 to January 1949 it remained unchanged at 45 cents, from January 1949 to December 1950 it remained at 54 cents, and from that date through 1953, at 60 cents per pound of contained MoS_2 in 90-percent concentrate, f.o.b. mines. In December 1954 the price rose to $1.05 per pound of contained Mo in 90-percent concentrate. Small shippers are likely to receive several cents less than the published price quotations. In 1954 pure molybdenum metal sold at from $6.35 to $16.70 per pound.

Ore minerals—Molybdenum never occurs free in nature, and its compounds are not numerous. The sulfide, molybdenite, MoS_2, containing 60.0 percent molybdenum, is the only important ore mineral, but minor ore minerals are the lead molybdate, wulfenite, $PbMoO_4$, containing 26.2 percent molybdenum; the oxide, molybdite, $Fe_2O_3 \cdot 3MoO_3 \cdot 8H_2O$, containing about 39 percent molybdenum; and the calcium molybdate, powellite, $Ca(Mo,W)O_4$, containing about 40 percent molybdenum. All these minerals have been found in Washington.

Ore at the Climax mine in Colorado, the largest molybdenum mine in the world, averaged about 0.5 percent MoS_2 in 1947, but a small deposit having molybdenum as its only recoverable value would have to be several times as rich as this in order to be minable at a profit. Some of the large disseminated copper ore bodies in this country carry about 0.04 percent MoS_2 as a recoverable byproduct.

Geology—Molybdenite almost always is associated with acid igneous rocks. In its economically most important concentrations it occurs as disseminations in replacement deposits. It also occurs in fissure veins, in contact metamorphic deposits, and in pegmatites. Molybdenite is of widespread occurrence in Washington and is found in each of the above types of deposits here, but generally not in sufficient quantity to be profitably recovered. Probably the most common associated mineral is chalcopyrite. Molybdite is an oxidation product of molybdenite, and wulfenite is found in the oxidized parts of some lead veins.

Occurrences

The map showing the numbered molybdenum occurrences is plate 17, on page 45 in volume 2.

CHELAN COUNTY

Aurelia Crown
(see Crown Point)

Copper King
(see Robischaud)

Crown Point (Aurelia Crown, Crown Power) (1)
Loc: NE¼ sec. 8, (31-16E), in cirque basin SW. of Hart Lk. at head of Railroad Cr. **Elev:** 4,300 ft. **Access:** Road to Holden and 6 mi. by trail to the mine. **Owner:** Chemical Products Association (1925-1926). Crown Point Mining Co. (1900-1907). Aurelia Crown Mines Corp. (1909-1918). Crown Point Mining Co. (1918). Crown Power Molybdenum Co. (1922-1924). **Ore:** Molybdenum. **Ore min:** Molybdenite, pyrite, chalcopyrite. **Deposit:** A flat-lying quartz vein in diorite. The vein has a max. thickness of 3 ft. but pinches to less than 3 in. Molybdenite occurs as large crystals in the quartz. **Dev:** 2 adits totaling more than 400 ft. Considerable ore has been stoped out. **Prod:** 1897-1902. Produced 10 tons of ore in 1901 and 12 tons in 1902. **Ref:** **33**, 1907, p. 546. **36**, pp. 283-288. **64**, pp. 78-83. **67**, p. 35. **88**, p. 55. **97**, 1901, 1902, 1904, 1914, 1934. **98**, 1918-1926. **104**, 9/30/33, p. 17. **105**, vol. 90, 1905, p. 125; vol. 91, 1905, pp. 22, 216. **112**, p. 167. **130**, p. 82. **133-B**, pp. 23-25. **141**, p. 94. **158**.

Crown Power
(see Crown Point)

Holden (2)
(see under copper)

Howe Sound
(see Holden under copper)

Irene
(see Holden under copper)

Jack Creek (6)
Loc: On Jack Cr. on N. side of Mt. Stuart. **Ore:** Molybdenum. **Ore min:** Molybdenite. **Ref:** **67**, p. 28. **130**, p. 84.

Keefer Brothers (4)
Loc: On W. slope of Red Mtn., near headwaters of Chiwawa R., about 1 mi. S. of Lyman Glacier. **Elev:** 6,200 to 6,800 ft. **Access:** Road to Royal Development mine, then 7 mi. by trail along Chiwawa R. **Prop:** Many unpatented claims. **Owner:** Lloyd and Boyd Keefer, 1918 N. Prescott, Portland, Oreg. (1948——). **Ore:** Molybdenum, copper, gold, silver, tungsten, uranium. Also reported are lead, zinc, nickel, cobalt, bismuth, antimony, chromium. **Ore min:** Molybdenite, chalcopyrite, arsenopyrite, pyrite, uraninite, gummite, scheelite. **Gangue:** Quartz, tourmaline, chlorite. **Deposit:** Narrow fissures with some hydrothermal alteration of the wall rock, which is granodiorite intruding schist and gneiss. **Dev:** Several hundred feet of workings divided among many claims. **Assays:** A channel sample taken at the most radioactive spot known on the veins assayed 0.1% U_3O_8. A pitchblende sample of unknown origin assayed 18.00% U_3O_8. The Ag content of the ore runs about 2 oz. for each 1% of Cu. **Ref:** **156**. **158**.

Merritt (Smith) (5)
Loc: NW¼NW¼ sec. 5, (26-16E), at Merritt. **Access:** 0.2 mi. by private road from Stevens Pass highway. **Owner:** Harry B. Smith, Merritt, Wash. (1944). **Ore:** Molybdenum. **Ore min:** Molybdenite, pyrrhotite. **Deposit:** Lens of pure white quartz in gneiss contains a little disseminated molybdenite. Too small to be commercial. **Ref:** **67**, p. 56. **158**.

Robischaud (Safety Harbor Creek, Copper King) (3)
Loc: SE¼ sec. 31, (31-20E), on headwaters of Safety Harbor Cr. **Elev:** 6,500 ft. **Access:** 5½ mi. by trail from end of road at Safety Harbor Cr. **Owner:** Norman Lindsley, Colville, Wash. (1933-1951). **Ore:** Molybdenum, copper, gold. **Ore min:** Molybdenite, chalcopyrite. **Deposit:** 2 systems of veins essentially at right angles to one another in highly altered rock. **Dev:** An adit cuts 12 east-trending and 3 north-trending veins each less than 18 in. wide. **Improv:** Small stamp mill (1933). **Prod:** A small stamp mill was set up in 1933 and the ore tested. Results indicated that economic recovery was not likely. **Ref:** **64**, p. 84. **67**, p. 26. **74**. **130**, p. 82. **133-B**, pp. 25-26. **141**, pp. 94-95.

Safety Harbor Creek
(see Robischaud)

Smith
(see Merritt)

FERRY COUNTY

Abe Lincoln (7)
(see under copper)

Addie B (10)
(see under copper)

Apex
(see Big Chief under lead)

Barstow (Lucky Five and Lakeview) (2)
Loc: Sec. 36, (38-36E), on Boulder Cr., 8 mi. N. of Boyds. **Access:** 2 mi. from railroad. **Prop:** 21 claims. **Owner:** Dayton Stewart and Joe Dilly, Spokane, Wash. (1942). **Ore:** Molybdenum. **Deposit:** Drill holes spaced as much as 2,000 ft. apart are said to have encountered molybdenum in amounts as high as 13%. **Dev:** 12 drill holes 8 to 10 ft. deep. **Assays:** Samples from 12 holes said to av. 1% Mo. **Ref:** **157**. **158**. **Note:** Former owner states that the reported molybdenite has been proven to be graphite.

Big Chief (4)
(see under lead)

Blevins
(see Meadow Creek under copper)

California (12)
(see under copper)

Chief
(see Big Chief under lead)

Clay (8)
(see under copper)

Cold Spring (3)
(see under lead)

Consolidated Mines and Smelting Co., Ltd.
(see under copper)

Great Western (6)
(see under silver)

Handspike (13)
(see under copper)

Iconoclast (14)
(see under copper)

Illinois (15)
(see under copper)

Jumper (16)
(see under copper)

Kelly Camp (1)
(see under tungsten)

King Richard
(see Meadow Creek under copper)

Lakeview
(see Barstow)

Lucky Five and Lakeview
(see Barstow)

Meadow Creek (9)
(see under copper)

Mount Tolman (11)
(see under copper)

Oregon
(see Illinois under copper)

Polepick (17)
(see under copper)

Rosario (5)
(see under copper)

San Poil Monitor
(see Meadow Creek under copper)

Schminski (19)

Loc: Secs. 1 and 2, (28-33E), 3 mi. N. of Hellgate Rapids, Keller dist. **Owner:** E. Schminski (1913). **Ore:** Molybdenum (gold and silver have been reported, but apparently erroneously). **Ore min:** Molybdenite. **Gangue:** Quartz, feldspar. **Deposit:** Molybdenite distributed in widely scattered tiny patches in pegmatite enclosed in granite. **Dev:** Several thousand feet of work, distributed among several adits. **Assays:** Gold assays reported to be consistently nil. **Prod:** None. **Ref: 122,** pp. 108, 139. **130,** p. 82. **141,** p. 96. **158.**

Walla Walla (18)
(see under copper)

GRANT COUNTY

Big Four
(see Electric City)

Black-Rosauer (1)
(see under silver and see also Electric City)

Daniels
(see Electric City)

Electric City (Big Four, Daniels, Black-Rosauer) (2)
(see also Black-Rosauer under silver)

Loc: Sec. 14, (28-30E), ½ mi. E. of Electric City, at foot of E. wall of Grand Coulee. **Prop:** 4 claims. **Owner:** Black-Rosauer Mines, Inc. (1937). Big Four Mining Co. **Ore:** Molybdenum, silver, gold. Bismuth, beryllium reported. **Ore min:** Molybdenite, pyrite, pyrolusite. **Gangue:** Quartz, fluorite. **Deposit:** Pegmatitic lenses of mineralized quartz as much as 10 ft. thick in granite. **Dev:** 100-ft. shaft, several cuts, pits, shallow shafts, and short adits. **Assays:** Probably less than 1% MoS_2. Owner states $5.00 in Au, $3.00 Mo. One sample showed 0.13% Mo, 1.90 oz. Ag, and no Bi, Be, Au. **Ref: 111,** p. 9. **157.**

KING COUNTY

Bear Basin (2)
(see under silver)

Clipper (5)
(see under copper)

Devils Canyon (3)

Loc: Sec. 26 and S½ sec. 27, (25-10E), Buena Vista dist. **Elev:** 3,200 to 3,700 ft. **Access:** Reached from railroad at North Bend by 35 mi. of road to Cougar Cr. and 1¼ mi. of trail to the property. **Prop:** 4 unpatented claims: Devil's Canyon, Vera, Cougar, Royal Flush. **Owner:** Consolidated Molybdenum, Inc., Seattle, Wash. (1948——). Dr. V. M. Osterberg (1912-1926). **Ore:** Molybdenum, tungsten, silver. **Ore min:** Molybdenite, powellite, pyrite, chalcopyrite, scheelite. **Gangue:** Quartz, siderite. **Deposit:** A shear zone as much as 25 ft. wide in altered granodiorite is laced by 1- to 6-in. quartz veinlets. Zone can be traced 600 ft. and has a depth of at least 400 ft. Some of the quartz veinlets are well mineralized with molybdenite. **Dev:** 160-ft. adit. **Improv:** Cabin (1952). **Assays:** A 4-ft. channel sample across face of the adit av. 0.11% MoS_2. Sample across 1-ft. width on surface showed 0.40% Mo, 0.29% WO_3. **Ref: 11-A,** pp. 222-231. **37,** p. 27. **130,** p. 82. **133,** p. 32. **133-B,** pp. 29-31. **158.**

Goat Mountain (4)
(see under lead)

Lost Lode (6)

Loc: Sec. 12, (24-9E), Snoqualmie dist. **Ore:** Molybdenum, lead, gold, silver. **Ore min:** Galena, molybdenite. **Ref: 58,** p. 40. **63,** p. 42. **158.**

Monte Carlo (1)
(see under gold)

KITTITAS COUNTY

Big Z
(see Zerwekh under gold)

Zerwekh
(see under gold)

LEWIS COUNTY

Eagle Peak (1)
(see under copper)

Short Canyon
(see under copper)

LINCOLN COUNTY

Egypt
(see Pitney Butte)

Pitney Butte (Spokane Molybdenum, Egypt) (1)

Loc: NE¼SE¼ sec. 32, (28-37E), on NE. side of Pitney Butte. **Elev:** 1,850 to 2,100 ft. **Access:** Road. **Prop:** 40 acres deeded land and 8 claims: Spokane, Isabella, Prosperity No. 1, Bayley Fr., and 4 others. **Owner:** Spokane Molybdenum Mines, Inc., Spokane, Wash. (1941——). **Ore:** Molybdenum, gold, silver. **Ore min:** Molybdenite, pyrite, pitchblende. **Gangue:** Quartz, fluorite. **Deposit:** A 3- to 4-ft. quartz vein in granite is fairly well mineralized but is badly faulted. Much of the vein is barren. Molybdenite occurs in scattered crystals through the quartz. In the main level a cross-fracture in the main vein contains a black radioactive lens 4 in. or more thick. **Dev:** 655-ft. adit. A 100-ft. crosscut with a 260-ft. drift cuts the vein 147 ft. higher than at the longer adit (1955). **Assays:** 0.03 to 0.10 oz. Au, 0.20 to 0.60 oz. Ag, tr. to 2.34% MoS_2. Small reserve of ore est. at 0.3%MoS_2 (1942). **Prod:** 1941. **Ref: 82-A. 97,** 1934, p. 429. **113,** 7/1/37, p. 16. **133-B,** pp. 31-34. **158.**

Spokane Molybdenum
(see Pitney Butte)

OKANOGAN COUNTY

Adams
(see Moncosilgo under copper)

American Graphite (32)
(see under gold)

American Rand
(see Spokane under gold)

Arnold Peak
(see Horseshoe Basin)

Billy Goat (2)
(see under copper)

Bi-Metallic (17)
Loc: NW¼ sec. 26, (39-29E), near Havillah. **Elev:** 4,100 to 4,800 ft. **Access:** 22 mi. by road from railroad at Tonasket. **Prop:** 4 patented claims, on NE ridge of Bi-Metallic Mtn. **Owner:** R. C. Mulligan, R. J. Pulley, M. F. Fowler, John Healem, Okanogan, Wash., leasing (1954——) from John B. Stanton, South Pasadena, Calif. (1946——). **Ore:** Molybdenum, copper, silver, gold, tungsten. **Ore min:** Molybdenite, molybdite, powellite, scheelite. **Gangue:** Kaolinized and sericitized granite porphyry. **Deposit:** Molybdenite in zone 1 to 5 ft. wide and 50 ft. long in fractures and intersecting faults in Moly adit. Also ore in 2 other fault zones in Moly adit. Slight radioactivity (up to 4 times background count) in ore zones. Oxidized copper mineralization in oval fractured zone 260 ft. long and 70 ft. wide. Deposit is in granite porphyry near contact with metasediments. **Dev:** 2 adits totaling 600 ft., several shafts, and trenches. Moly adit is at 4,580-ft. elev. **Assays:** Weighted av. of 4 samples in ore zone is 3.07% Mo across av. width of 4.9 ft. 27 assays by U. S. Bureau of Mines show tr. to 3.87% Mo, 0.02% to 1.26% Cu, tr. to 0.50 oz. Ag, tr. Au. 12 other assays of representative samples av. 1.68% MoS_2. **Prod:** Several tons of copper-gold ore in 1918. 500 lb. of high-grade molybdenum ore was shipped. **Ref:** **63**, p. 110. **97**, 1918, p. 506. **98**, 1925, p. 1805. **133-B**, pp. 34-44. **151**. **158**.

Boundary
(see Sheep Mountain)

Buck Mountain (24A)
(see under tungsten)

Buckhorn
(see Buck Mountain under tungsten)

Caaba
(see Kaaba under lead)

Campbell
(see Holden-Campbell under gold)

Carr (3)
(see under copper)

Corson (25)
Loc: SE¼NE¼ sec. 5, (32-27E), near Omak Lk. **Access:** ¾ mi. from highway. **Owner:** Abandoned (1950). O. F. Corson leasing to T. T. Spencer and Joe Matthews, Winlock, Wash. (1939). **Ore:** Molybdenum. **Ore min:** Sparse molybdenite. Scheelite reported. **Deposit:** Pegmatite in steeply dipping schists and gneisses. **Dev:** Open cut. **Ref:** **158**.

Crescent
(see Triune under gold)

Dodd
(see Sheep Mountain)

Dutch John (28)
(see under tungsten)

Eagle (18)
(see under gold)

Fluorspar
(see Tonasket under copper)

Four Metals (9)
(see under lead)

Frankie Boy (22)
(see under silver)

Golden Chariot (12)
(see under copper)

Golden Zone (8)
(see under gold)

Green Lake (24)
Loc: SW¼NW¼ sec. 13, (34-25E), about 1 mi. W. of Green Lk. **Ore:** Molybdenum. **Ore min:** Molybdenite. **Deposit:** Quartz vein containing molybdenum. **Ref:** **158**.

Hanks (4)
(see under copper)

Holden-Campbell (30)
(see under gold)

Hoot Owl (31)
Loc: NE¼ sec. 22, (34-29E), Park City dist. **Owner:** Molybdenum Mines Co. (1934-1937). **Ore:** Molybdenum, gold. **Gangue:** Calcite, quartz. **Deposit:** 100-ft. mineralized zone. **Assays:** 0.02 oz. Au, 0.014% Mo, 3.43% graphite. **Ref:** **97**, 1938, p. 566. **104**, 8/30/33, p. 18. **158**.

Horseshoe Basin (MacPhearson, Arnold Peak) (7)
Loc: Center sec. 11, (40-23E), on S. slope of Arnold Peak. **Elev:** 7,000 to 7,500 ft. **Access:** Road from Loomis to Duncan James ranch, thence by bulldozer road to Horseshoe Basin. **Prop:** 2 claims: Horseshoe Basin No. 1 and No. 2. **Owner:** Paul Loudin, Robert Curtis, Loy McDaniels, Loomis, Wash. (1951). Fred Manweller (1926). **Ore:** Molybdenum. **Ore min:** Molybdenite, reportedly tantalum. **Gangue:** Quartz. **Deposit:** Pegmatite dikes in schist in an area ¼ mi. long and 300 ft. wide. **Dev:** Open cut. **Assays:** No Au, Ag, Cu; 1.12% MoS_2. **Prod:** 1941. **Ref:** **133**, p. 35. **133-B**, pp. 46-48. **158**.

Hudnut (Hudnutt) (36)
(see under zinc)

Independence (29)
(see under gold)

Jim Dodd
(see Sheep Mountain)

Kaaba (11)
(see under lead)

Kaaba-Texas
(see Kaaba under lead)

Lady of the Lake (23)
(see under silver)

Lodge
(see Dutch John under tungsten)

Luke
(see Molly under copper)

MacPhearson
(see Horseshoe Basin)

Malott (26)
(see under copper)

Mineral Hill (21)
(see under silver)

Molly (6)
(see under copper)

Molly (Sheep Mountain)
(see Sheep Mountain)

Moncosilgo (14)
(see under copper)

Montgomery
(see Tonasket under copper)

O. K. (13)
(see under copper)

Pioneer
Loc: Palmer Mtn. dist. **Ore:** Molybdenum. **Ref: 105,** 1907, p. 201.

Rustler (27)
(see under gold)

Seven Devils
(see Mineral Hill under silver)

Sheep Mountain (Molly, Dodd, Jim Dodd, Boundary) (1)
Loc: SW¼ sec. 8, (40-20E), on E. side of Sheep Mtn. about 1¾ mi. S. of Monument No. 90 on the international boundary. **Elev:** 7,500 ft. **Access:** 5 mi. from road. **Prop:** 2 claims: Moly Nos. 1 and 2. **Owner:** J. J. Sullivan, Pateros; Orin Dodd, Wenatchee; and Lester Dodd, Wenatchee (1942). **Ore:** Molybdenum, gold, silver. **Ore min:** Molybdenite, free gold, pyrite. **Deposit:** 3 parallel gently dipping quartz lenses in granite. The lenses are well defined and from 4 in. to 5 ft. thick. **Dev:** Open cuts, 60-ft. adit. **Ref: 130,** p. 81. **133-B,** pp. 48-50. **141,** p. 95. **158.**

Sherwood
(see Dutch John under tungsten)

Silver Tip
(see Starr)

Spokane (15)
(see under gold)

Starr (Silver Tip) (19)
Loc: SE¼ sec. 8 or NE¼ sec. 16, (37-26E), on E. flank of Aeneas Mtn. between Aeneas Cr. and Horse Springs Coulee. **Elev:** 3,200 ft. **Access:** 1 mi. of road from Aeneas Cr. road in NE¼ sec. 17, (37-26E). 12 mi. from railroad at Tonasket. **Prop:** 1 claim: Silver Tip. **Owner:** Wilbur Starr, Tonasket, Wash. (1942-1945). Molybdenum Products Co. (1926). Molybdenum Corporation of America (1928). Titanium Alloy Manufacturing Co. (1936). **Ore:** Molybdenum, tungsten. **Ore min:** Pyrite, molybdenite, scheelite, chalcopyrite, and rarely arsenopyrite and pyrrhotite. **Gangue:** Quartz. **Deposit:** Mineralized fracture zone in granite 80 by 400 ft. in plan and at least 240 ft. in depth. Est. 800,000 tons of 0.30% MoS_2 ore. **Dev:** Main adit of 1,800 ft., 2 short adits and several open cuts total nearly 3,000 ft. of workings. Deposit has been developed to depth of 250 ft. **Assays:** Fraction of one percent scheelite, and 0.165% to 0.7% MoS_2. Av. of 29 general samples was 0.42% MoS_2. Av. of 8 other samples was 0.53% MoS_2. **Prod:** 3,000 tons of ore from dump shipped to mill at Nighthawk in 1939 reported to assay 1% MoS_2. **Ref: 34. 37,** p. 42. **64,** p. 83. **97,** 1927, pp. 398-399. **106,** 8/2/28, p. 3. **130,** p. 81. **133-B,** pp. 51-62. **141,** p. 95. **157. 158.**

Sterling (34)
Loc: NW¼SE¼ sec. 8, (31-30E). **Access:** 6 mi. NW. of Nespelem. Road for 4 mi. at least. **Prop:** 1 claim: Sterling. **Ore:** Molybdenum. **Ore min:** Molybdenite, pyrite, limonite. **Deposit:** 15-ft. quartz vein contains sparsely disseminated flakes of molybdenite and pyrite. **Dev:** Small shaft, open cuts. **Assays:** Appears to be barren of Cu, Pb, Zn minerals. **Ref: 122,** p. 79.

Summit (10)
(see under silver)

Swayne (5)
(see under copper)

Texas Creek
(see Dutch John under tungsten)

Tonasket (20)
(see under copper)

Triune (16)
(see under gold)

Twin Pine (35)
(see under zinc)

Wasco (33)
(see under silver)

Washington Consolidated
(see Mineral Hill under silver)

Washington Nickel
Loc: Tonasket dist. **Owner:** Washington Nickel Mining and Alloys Co. (1936). **Ore:** Molybdenum. **Ref: 104,** 3/15/36, p. 23; 7/15/36, p. 30.

PEND OREILLE COUNTY

Coffin (2)
(see under zinc)

Little Noisy (3)
(see under zinc)

Molybdenite Mountain (4)
Loc: Sec. 18, (37-44E), Metaline dist. **Access:** 6 mi. by trail. **Prop:** Several unpatented claims. **Owner:** Abandoned (1941). Empire Molybdenite Mining & Milling Co. (1918-1922). Molybdenum Mining & Milling Co. (1925). **Ore:** Molybdenum. **Ore min:** Molybdenite, pyrite. **Deposit:** A quartz vein 3 ft. wide and exposed for a length of 40 ft. is sparsely mineralized with molybdenite and pyrite. **Dev:** 40-ft. adit, open cuts. **Prod:** $6,000 prior to 1916. **Ref: 29,** p. 52. **98,** 1922-1926. **105,** 1916, p. 387. **112,** p. 178. **116,** no. 11, 1907, p. 7.

Polly Molly (1)
Loc: Sec. 36, (40-43E), Metaline dist. **Access:** Near road. **Prop:** 2 unpatented claims. **Owner:** Abandoned (1941). Metaline Contact Mines. **Ore:** Molybdenum. **Deposit:** Some traces of molybdenum found. **Dev:** Open cuts and stripping. **Ref: 29,** p. 42.

PIERCE COUNTY

Golden Rule (1)
(see under zinc)

White River
Loc: Near White R. glacier on N. side of Mt. Rainier. **Ore:** Molybdenum. **Ref: 130,** p. 84.

SKAGIT COUNTY

Bornite
(see North Coast under gold)

British
(see Skagit Queen under silver)

North Coast (2)
(see under gold)

Skagit Queen (3)
(see under silver)

Thunder Creek
Loc: On Thunder Cr., a headwater tributary of Skagit R. **Ore:** Molybdenum. **Ore min:** Molybdenite. **Deposit:** Said to be a promising deposit. **Note:** Investigation in this area by the Division of Geology (1940) did not reveal any molybdenite. **Ref: 130,** p. 82. **141,** p. 96.

Washington (1)
Loc: Up Skagit R. 5 mi. from Marblemount. **Owner:** Washington Molybdenum Co. (1935). **Ore:** Molybdenum. **Ref: 158.**

SKAMANIA COUNTY

Columbia Gold and Copper
(see Miners Queen under copper)

Miners Queen (1)
(see under copper)

Spirit Lake
Loc: Near Spirit Lk. **Owner:** Molybdenite Co., Ltd. (1937). **Ore:** Molybdenum. **Ref: 158.**

SNOHOMISH COUNTY

Armament (17)
(see under copper)

Bergensen
(see Taylor & Nunn under gold)

Bonanza
(see Mineral Center under copper)

Calumet
(see Glacier Peak under copper)

Copper Lake (6)
Loc: Sec. 4, (29-10E), at head of Copper Lk., Sultan Basin. **Elev:** 3,600 ft. **Access:** 7 mi. from Sultan Basin road by trail up Williamson Cr. **Ore:** Molybdenum. **Ore min:** Molybdenite. **Deposit:** Molybdenite sparsely present in ¼-in. quartz veinlets on sides of quartz diorite talus blocks. **Ref: 133-B,** p. 63. **158.**

Edison
(see Mineral Center under copper)

Engdahl
(see Martin Engdahl under lead)

Glacier Peak (4)
(see under copper)

Golden Eagle (14)
Loc: S½ sec. 7, (28-10E) and SE¼ sec. 12, (28-9E), Sultan Basin dist. **Elev:** 3,000 to 3,400 ft. **Access:** 6 mi. of trail up S. Fk. Sultan R., and 20 mi. by road to railroad at Sultan. **Prop:** 10 unpatented claims. **Owner:** Washington Molybdenum Co., Seattle, Wash. (1943). **Ore:** Molybdenum, gold, silver. **Ore min:** Molybdenite, chalcopyrite, scheelite, pyrite. **Gangue:** Quartz, gouge. **Deposit:** Gouge zone 6 to 30 in. thick and narrow mineralized fractures in quartz diorite, also a 3-ft. pegmatite lens. **Dev:** Open cuts and pits. **Prod:** 1941. **Ref: 23,** p. 75. **133-B,** p. 64. **158.**

Hicks
(see Sultan King under copper)

Hustler (7)
(see under copper)

Iowa (10)
(see under copper)

Jones
(see Kromona under copper)

Kromona (16)
(see under copper)

Louise
(see Mineral Center under copper)

Martin Engdahl (13)
(see under lead)

Mineral Center (12)
(see under gold)

Mint
(see Iowa under copper)

Molly (18)
(see under uranium)

Nesta (3)
(see under copper)

North Star
(see Sunrise under gold)

Nunn
(see Taylor & Nunn under gold)

Oldfield
(see Sunrise under gold)

Rustler (8)
(see under copper)

St. Theresa (15)
Loc: S½ sec. 1 and N½ sec. 12, (28-9E), Sultan Basin dist **Elev:** 2,000 to 4,500 ft. **Access:** 5 mi. by trail up S. Fk. Sultar R., and 20 mi. by road to railroad at Sultan. **Prop:** 10 unpatented claims. **Owner:** Washington Molybdenum Co., Seattle, Wash. (1943). **Ore:** Molybdenum, copper. **Ore min:** Molybdenite, chalcopyrite. **Gangue:** Quartz, calcite, siderite. **Deposit:** Widely distributed mineralized fractures paper thin to 2 in. wide in quartz diorite. **Ref: 23,** pp. 74-75. **133-B,** p. 65. **158.**

Scriber
(see Kromona under copper)

Silver Horseshoe (5)
(see under silver)

Sultan King (11)
(see under copper)

Sultan Queen
(see Sultan King under copper)

Sunrise (1)
(see under gold)

Sunrise (9)
(see under copper)

Taylor & Nunn (2)
(see under gold)

Tum Tum
(see Taylor & Nunn under gold)

Washington-Iowa
(see Mineral Center under gold)

Wayside
(see Armament under copper)

STEVENS COUNTY

Aladdin
(see Sierra Zinc under zinc)

American (2)
Loc: SE¼SW¼ sec. 16, (38-39E), about ¼ mi. NE. of Phalen Lk. **Elev:** 2,500 ft. **Access:** 15 mi. by road from railroad at Bossburg. **Prop:** State land. **Ore:** Molybdenum. **Ore min:** Molybdenite, pyrite. **Deposit:** 25 ft. E. of a granite-slate contact there is a ¼-in. to 5-ft. quartz vein which can be traced for about 100 ft. **Dev:** Open cuts. **Ref: 133-B,** pp. 65-66. **158. 164,** pp. 177-178.

Black Horse
(see Columbia Tungsten under tungsten)

Blue Ridge
(see Sierra Zinc under zinc)

Blue Star
(see Eagle under silver)

Chewelah Eagle
(see Eagle under silver)

Chewelah Standard (14)
(see under copper)

Columbia River (8)
(see under copper)

Columbia Tungsten (11)
(see under tungsten)

Constitution
(see Lawrence)

Coyote
(see Rightside under copper)

Deer Trail Monitor (17)
Loc: Near NW. cor. sec. 24, (30-37E), Deer Trail dist. **Elev:** 3,500 ft. **Access:** 5½ mi. E. of Fruitland by road. 31 mi. by road to railroad at Springdale. **Prop:** 9 unpatented claims: Chance, Chance No. 2, Mercy, Mobile, Mainstay, Mogul, Montreal, Monitor, and Mohawk; and 480 acres of deeded land. **Owner:** Deer Trail Monitor Mines Co., Spokane, Wash. (1929-1944). **Ore:** Molybdenum, copper. **Ore min:** Molybdenite, chalcopyrite, pyrite, pyrrhotite. **Gangue:** Garnet, epidote, calcite. **Deposit:** Greenish siliceous mineralized zone cutting limestone and argillaceous limestone series near its contact with Loon Lk. granite. The molybdenite is intimately associated with the garnet zone. **Dev:** About 3,000 ft. of workings on 3 levels. **Improv:** Physical plant, removed (1952). **Assays:** Ore mined av. 0.46% to 0.28% MoS_2. **Prod:** In 4 months in 1936 and 1937 mill produced 5 tons of 60% MoS_2 conc. from 2,000 tons of 0.16% MoS_2 ore. 210 tons of 0.28% MoS_2 ore yielded 2,500 lb. 47.4% MoS_2 conc., 1938. 3,000 tons ore yielded 10 tons of conc. in 1939. Produced 1941. **Ref: 30,** p. 67. **58,** p. 18. **97,** 1937-1940. **99,** no. 4, 1935. **104,** 7/15/35, p. 26; 10/30/36, p. 32. **106,** 7/16/31. **133-B,** pp. 66-67. **158.**

Eagle (13)
(see under silver)

Easy Money
(see Magma under zinc)

Eldorado
(see Magma under zinc)

Germania (18)
(see under tungsten)

Germania Consolidated (19)
(see under tungsten)

Gray Eagle
(see Rightside under copper)

Industrial Tungsten
(see Germania Consolidated under tungsten)

Judd
(see Lawrence)

Juno-Echo (15)
(see under copper)

Keeth
(see Germania Consolidated under tungsten)

Koyotte
(see Rightside under copper)

Lawrence (Constitution, Judd) (3)
Loc: Sec. 21, (38-39E), E. of Phalen Lk. **Access:** Road. **Prop:** 4 unpatented claims. **Owner:** Joe Day and/or William Heritage, Colville, Wash. (1941). **Ore:** Molybdenum. **Ore min:** Molybdenite. **Gangue:** Quartz. **Deposit:** Small lenses or pockets of lean ore in granite near its contact with argillite. Argillite near contact contains molybdenite seams also. **Dev:** 100 ft. of workings in 3 adits, and several open cuts. **Ref: 30,** pp. 82-83. **158.**

Magma (7)
(see under zinc)

Nellie S.
(see Chewelah Standard under copper)

New Leadville (5)
(see under lead)

Norton
(see Germania Consolidated under tungsten)

O'Neal
(see Rightside under copper)

Ray Cox Moly (4)
Loc: NE. cor sec. 33, (38-39E). **Access:** Road up Bruce Cr. **Owner:** Ray Cox, Colville, Wash. (1950). **Ore:** Molybdenum. **Ore min:** Molybdenite. **Deposit:** Widely scattered thin quartz-filled fractures in green lime-silicate rock close to granite contact. **Ref: 158.**

Redwood
(see Eagle under silver)

Rightside (9)
(see under copper)

Rocky Lake (10)
Loc: SE¼NE¼ sec. 34, (35-39E), Colville dist. **Access:** ¼ mi. from road by which it is 2 mi. to railroad at Arden. **Prop:** 8 unpatented claims. **Owner:** None (1949). Formerly owned by Ross Moorehead, Colville, Wash. **Ore:** Molybdenum, gold, silver, copper. **Ore min:** Molybdenite, pyrite. **Gangue:** Quartz. **Deposit:** Said to be an 8-ft. altered zone, traceable for 400 ft. in granite. Zone contains 30 in. of quartz having sparsely scattered molybdenite and pyrite. **Dev:** 100-ft. inclined shaft, open cuts. **Ref: 30,** p. 51. **158.**

Sand Creek (20)
(see under tungsten)

Schenk
(see Rightside under copper)

Short Wait (1)
(see under lead)

Sierra Zinc (6)
(see under zinc)

Stockwell
(see Columbia Tungsten under tungsten)

Tungsten King (16)
(see under tungsten)

Washington Metals (12)
(see under tungsten)

Western Molybdenum
(see Juno-Echo under copper)

Yo Tambien
(see New Leadville under lead)

WHATCOM COUNTY

Castleman

Loc: Mt. Baker dist. **Ore:** Molybdenum. **Prod:** Produced in 1898. **Ref:** 43, vol. 68, 1899, p. 800. 97, 1899, p. 307. 141, p. 96. **Note:** Division of Mines and Geology could not verify this reported occurrence.

Midas (1)

Loc: Sec. 25, (40-9E), Mt. Baker dist. **Owner:** J. A. Nesbitt and John and David Cress, Bellingham, Wash. (1949). **Ore:** Molybdenum. **Deposit:** Owners reported showings too small to be of interest. **Ref:** 68, p. 13.

Shuksan
(see Sulphide Creek)

Silver Creek (2)

Loc: S½ sec. 8, (40-13E), on Silver Cr., 2 mi. S. of Canadian boundary. **Elev:** 2,200 ft. **Access:** Boat up Ruby Lk., thence by trail up Silver Cr., or by road through Canada to mouth of Silver Cr. **Prop:** 4 claims, including Molybdenum, Lost Mine. **Owner:** Roy Davis, George Hunt, A. E. Blockberger, Shelton, Wash. (1950). H. B. Davis and Dr. Harry Deegan, Shelton, Wash. (1939). **Ore:** Molybdenum, copper, gold, silver. **Ore min:** Molybdenite, chalcopyrite. **Deposit:** On S. side of Silver Cr. in granodiorite near contact with volcanic rock is zone 10 ft. wide containing ¼- to 1-in. quartz stringers with scattered chalcopyrite and clusters of molybdenite. On N. side of creek an open cut and an adit 64 ft. lower show a bleached and silicified zone in volcanic breccia 50 ft. in dia. containing scattered molybdenite and chalcopyrite. **Dev:** 85-ft. adit, open cuts. **Assays:** Chip sample of zone at face of adit showed Au nil, Ag 0.40 oz., Cu 1.50%, molybdenite 0.15%. In open cut 64 ft. higher the ore is est. to carry 1% molybdenite and 2% to 3% Cu. **Ref:** 133-B, pp. 87-88. 158.

Sulphide Creek (Shuksan) (3)

Loc: At head of N. Fk. of Sulphide Cr., on E. side of Mt. Shuksan. **Owner:** Charles Bagnell and Robert Johnson, Concrete, Wash. Joe Morovitz (1916). Mount Shuksan Molybdenite Mine and Milling Co. (1917). **Ore:** Molybdenum. **Ore min:** Molybdenite. **Gangue:** Quartz. **Deposit:** Veins up to 1 in. thick, also as films along joints. **Assays:** Reported to be of no economic value. **Ref:** 158.

YAKIMA COUNTY

Bird (2)
(see under tungsten)

Chinook (1)
(see under copper)

Copper Mining Co. (3)
(see under copper)

Crosetti (4)

Loc: Sec. 21, (15-12E), Bumping Lk. dist. **Ore:** Molybdenum. **Ore min:** Molybdenite. **Deposit:** Very slight molybdenite mineralization along joints in aplite stringers in granodiorite. **Ref:** 158.

NICKEL

Properties—Nickel is a lustrous white metal capable of taking a high and lasting polish. It is harder than iron and is tenacious and very malleable and ductile. It is somewhat magnetic and is a fair conductor of heat and electricity, its electrical conductivity being about one-fifth that of copper. Nickel imparts to its alloys toughness and strength as well as desirable anti-corrosion and thermal properties. Chemically, it is closely allied with cobalt and iron. Nickel has valences of 2 and 3, but in most of its compounds it is bivalent. The metal is stable in air at ordinary temperatures. Other properties are shown in the table on page 12.

Uses—Although the pure metal is used for electroplating, nickel is chiefly valuable for the alloys it forms with other metals. Over 3,000 alloys of nickel with iron and copper have been developed. Other metals with which it has been alloyed are silver, zinc, tin, beryllium, magnesium, aluminum, and cobalt. The steel and iron industry used about 43 percent of the nickel consumed in the United States in 1950. The leading uses in their order of importance were for nonferrous alloys, stainless steel, electroplating, other steels, high-temperature and electrical-resistance alloys, cast iron, catalysts in hydrogenating organic substances, and ceramics. Minor uses are in coinage, in Edison alkaline storage batteries, and in pharmaceuticals and dyes.

Production—There are few nickel smelters in the world, and most of them do little, if any, custom smelting. Although the United States accounts for more than half of the world nickel consumption, domestic production of the metal amounts to less than 1 percent of that of the world. About 80 to 85 percent of the world production normally comes from Canada. The small domestic output in 1950 was in the form of nickel sulfate and came entirely as a byproduct of copper smelting from five smelters, one of which was the copper smelter of the American Smelting and Refining Company, at Tacoma, Washington.

Although nickel occurrences have been reported in at least 13 counties in Washington, no ore has ever been mined for its nickel content in this state. Some of the lateritic deposits in the Cle Elum River-Blewett area in Kittitas and Chelan Counties are of sufficient size and